Lincoln Impact Fee Study

for Arterial Streets, Water, Wastewater, and Neighborhood Parks and Trails

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OVERVIEW

This study is an outgrowth of the Infrastructure Financing Study initiated by the City in June 2000. Three reports were prepared: *Financial Alternatives Memorandum* (September 2000), *Capital Cost Memorandum* (September 2000) and *Fiscal Impact Analysis Memorandum* (November 2000). These reports attempted to quantify the capital and operating costs of accommodating new development at existing levels of service for municipal facilities, such as roads, water and wastewater service.

In this study, we estimate the net capital cost to accommodate new development at the City of Lincoln's existing levels of service for arterial streets, water and wastewater facilities and neighborhood parks and trails. The study builds on the work previously done for the *Capital Cost Memorandum*. The analysis is based on accepted methods of impact fee analysis, which take into account not only the cost of new capital facilities needed to accommodate growth, but also the revenues that will be generated by new development over the useful life span of the capital facilities that will be available to help pay for a portion of those growth-related capital costs. The revenue credits are deducted from the costs to determine the net costs of serving new development.

The first draft of this report was prepared in June 2002. The report was updated to accomplish the following: (1) to reflect changes in the impact fee ordinance approved by the Planning Commission on October 16th, (2) to address comments by the development community pertaining to the capacity added by arterial street improvements and (3) to correct the major road inventory to include all principal and minor arterials.

The analysis presented in this report represents the maximum potential impact fees that could be charged by the City of Lincoln for all the facilities surveyed. As summarized in the table below, the net capital cost to provide a new single-family dwelling with the four types of infrastructure addressed in this study at current levels of service totals $9,017. Potential fees for other land use types are also estimated (water and wastewater fees will vary depending on meter size).

Table 1
MAXIMUM POTENTIAL FEES BY LAND USE

Facility Type	Single-Family (unit)	Multi-Family (unit)	Retail (10,000 sq. ft.)	Office (10,000 sq. ft.)	Industrial (10,000 sq. ft.)
Arterial Streets*	$3,212	$1,955	$42,510	$47,160	$28,980
Water**	$3,669	$611	$3,910	$3,910	$3,910
Wastewater**	$1,815	$302	$1,940	$1,940	$1,940
Neighborhood Parks and Trails	$321	$190	$0	$0	$0
Total	$9,017	$3,059	$48,360	$53,010	$34,830

* excludes ROW costs
** multi-family unit assumes 6" meter per 200 units; nonresidential assumes 3" meter for 100,000 sq. ft.
Source: Maximum fees from Tables 11, 26, 34 and 49.

While the cumulative potential fee per single-family unit may seem large, it should be kept in mind that some developers are already contributing to some of these capital improvement costs, particularly for arterial streets and water and wastewater line extensions, through existing developer exaction policies. The City Council could adopt impact fees at some percentage less than 100 percent of the net capital costs identified in this report. A portion of potential road impact fee revenues will be needed to reimburse developers for system improvements, and adoption of impact fees at an artificially low level may result in excessive obligations on the City to provide such reimbursement.

If the fees are adopted at 100 percent of the maximum levels shown in the previous table, potential annual impact fee revenues (or developer contributions for which credits against the fees are given), could total about $20 million, as shown in Table 2.

Table 2
POTENTIAL ANNUAL IMPACT FEE REVENUE/ASSETS

Facility Type	Total
Arterial Streets	$9,213,000
Water	$6,648,000
Wastewater	$3,289,000
Neighborhood Parks and Trails	$480,000
Total	$19,630,000

Source: Maximum fees from Table 1 and annual growth estimates of 1,200 single-family units, 500 multi-family units, 250,000 sq. ft. retail, 550,000 sq. ft. office/service and 250,000 sq. ft. industrial from Lincoln/Lancaster County Planning Department, March 1, 2002.

ARTERIAL STREETS

The arterial street system maintained by the City of Lincoln is a key component of local infrastructure that makes development of land within the city possible. The demands placed upon the arterial street system by growth necessitate costly improvements, including the widening of existing roads, intersection and signalization improvements and the construction of new roads to relieve congested corridors.

Currently, new development makes contributions toward the cost of expanding the arterial system through several mechanisms. New development is subject to development exactions, which include requirements for dedication of right-of-way and sometimes for construction of adjacent arterial streets. New development also contributes by generating increased motor fuels taxes and vehicle registration fees, some of which are used by the City for capacity-expanding arterial street improvements.

Developers are required to dedicate the full width of right-of-way (ROW) for the ultimate cross-section required by the Transportation Plan. Right-of-way is the most variable component of road improvement costs, as well as the most common type of developer exaction for roads. In this report, ROW costs are excluded from the impact fee calculations. As a result, the fees are lower than they would otherwise be, but by the same token the City will not have to give credit against the fees for ROW that is dedicated by developers.

The arterial street improvements that are required of developers as a condition of development approval are negotiated on a case-by-case basis. This process of negotiated developer contributions is commonplace, but is often criticized for being unpredictable, time-consuming and unfair. The fairness arguments are that the process penalizes larger developers, developers with frontage on streets needing improvement, and late-comers whose traffic triggers the need to widen a street or install turn lanes at an intersection. Developer exactions also do not address congestion in older parts of the community resulting from development on the fringes.

The analysis presented in this section estimates the net capital cost of major roadway (i.e., arterial) improvements required to accommodate growth in Lincoln. The net cost excludes the portion of the cost that is paid for by future gas tax, wheel tax and other highway user fees generated by the new development, but not the value of developer contributions toward the arterial system. These contributions are difficult to quantify and vary widely between developments. As a general rule, however, it has been our experience that developer exactions rarely recover more than half of the net capital costs of growth-related roadway improvements. By the same token, if the City were to adopt impact fees to recover the full net capital cost, the actual revenues may only be half as much as might be expected, due to credits against the impact fees to developers for improvements to arterial streets.

Service Area

In an impact fee system, a "service area" is an area where a set of capital facilities benefits the development located in the area, and all new development in the area is subject to a single fee schedule. A similar concept is that of "benefit area," which is an area in which the fees collected are earmarked for expenditure. A service area may be divided into multiple benefit areas in order to show a greater link between fees paid and benefit received, even though the larger service area is appropriate for determining average costs to serve new development.

Since the arterial street system is designed to move traffic from one part of the community to another, arterial street impact fees are generally calculated at the jurisdictional level, and a single fee schedule applies city-wide. Some arterial street impact fee systems, however, exclude older parts of the community from the service area, on the grounds that these areas have little development potential and the arterial system is largely built-out. For example, the City of Kansas City, Missouri, recently adopted arterial street impact fees that applied to all areas that were annexed after 1950. Areas excluded from the impact fee service area are not eligible for improvements funded with impact fee revenues.

Following consultation with City staff and stakeholders, it was determined that an area generally inclusive of the downtown and the Antelope Valley redevelopment area should be excluded from the arterial street impact fee service area. The proposed exclusion area is shown in Figure 1.

Although we do not believe it to be necessary to meet rational nexus requirements, the City has determined to divide the service area into seven benefit areas. The proposed benefit areas are illustrated in Figure 2.

Figure 1
ARTERIAL STREET IMPACT FEE EXCLUSION AREA

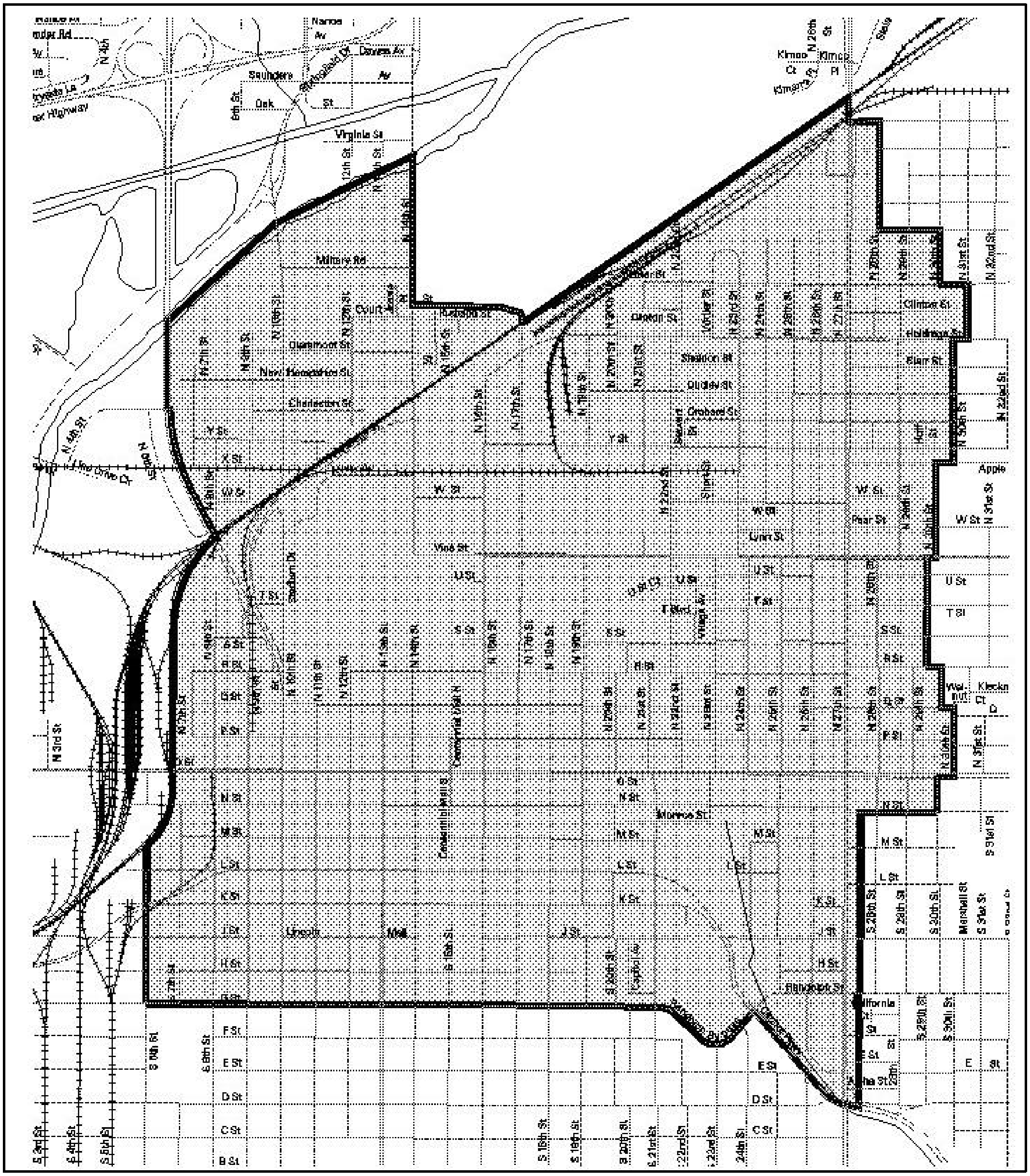
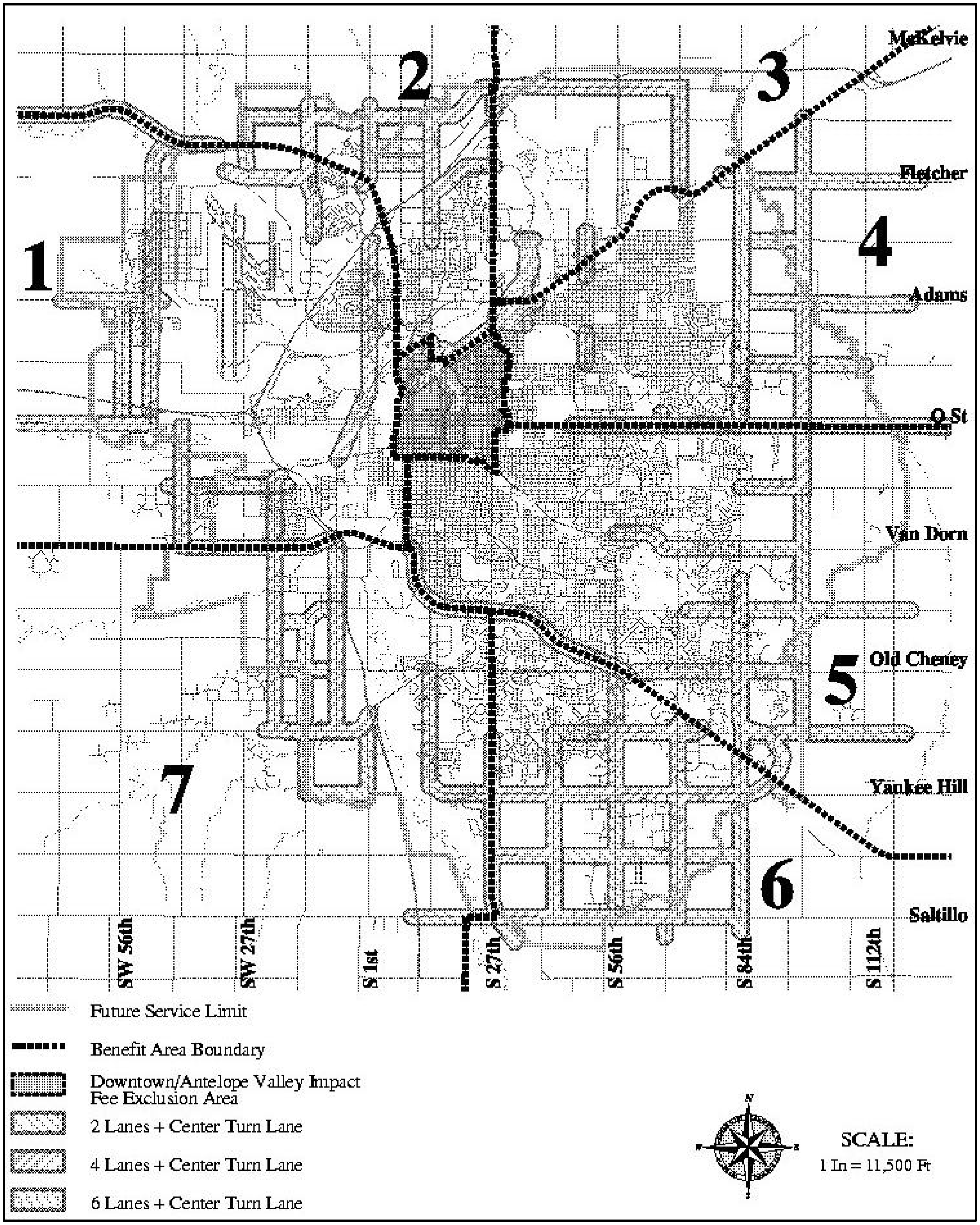


Figure 2
ARTERIAL STREET IMPACT FEE BENEFIT AREAS



Service Unit

In impact fee analysis, capital costs, revenue credits and net costs are calculated on the basis of "service units." A service unit is a common unit of demand and capacity, often defined as "a standardized measure of consumption, use, generation or discharge." An appropriate service unit for arterial street capital cost analysis is vehicle-miles of travel (VMT). Vehicle-miles is a combination of the number of vehicles traveling during a given time period and the distance (in miles) that these vehicles travel. Generally, the most critical period for arterial street capacity in urban areas is during the evening peak hour, and for this reason peak hour VMT was chosen as the service unit for the arterial street capital cost analysis. The unit of capacity that is consumed by the demand unit represented by a VMT is a vehicle-mile of capacity (VMC). VMC is the peak hour capacity at the desired level of service of a roadway segment multiplied by the length of the segment in miles.

Although the capital cost analysis is based on peak hour traffic conditions, local data is often available only in terms of average daily traffic. Consequently, a peaking factor is needed to convert average daily demand and capacity data to peak hour values. Based on national data, approximately ten percent of daily travel occurs in the afternoon peak hour.[1] This factor will be used to convert between average daily and peak hour values.

Methodology

The major alternative methodologies for calculating road impact fees are the "improvements-driven" and "consumption-based" approaches. These are described below.

The "improvements-driven" approach essentially divides the cost of growth-related improvements required over a fixed planning horizon (or to build-out) by the number new service units (e.g., VMT) projected to be generated by growth over the same planning horizon in order to determine a cost per service unit. The improvements-driven approach depends on accurate planning and forecasting. For example, the fees will be accurate only if the forecasted increase in traffic actually necessitates all of the improvements identified in the transportation master plan. If many of the planned improvements will provide excess capacity over the planning horizon that will be available to serve additional development beyond the planning horizon on which the fees are based, the fees may be too high.

The recommended "consumption-based" approach avoids these problems, because it does not depend on knowing in advance what improvements will be made or what type or density of development will occur. The consumption-based model simply charges a new development the cost of replacing the capacity that it consumes on the arterial system. That is, for every service unit of

[1]According to the Institute of Transportation Engineers (ITE), *Transportation and Traffic Engineering Handbook*, 1982, p. 283, "Approximately 10% of all person travel takes place in the morning peak period, and again in the evening peak period." The ratio of PM peak hour trip rates to average daily trip rates for 115 land use categories from the 1997 sixth edition of the ITE *Trip Generation* manual averages 9.82%.

traffic generated by the development, the road impact fee charges the net cost to construct an additional service unit of capacity.

Since travel is never evenly distributed throughout a roadway system, actual roadway systems require more than one unit of capacity for every unit of demand in order for the system to function at an acceptable level of service. Suppose for example, that the City completes a major arterial widening project. The completed arterial is likely to have a significant amount of excess capacity for some period of time. If the entire system has just enough capacity to accommodate all of the vehicle-miles of travel, then the excess capacity on this segment must be balanced by another segment being over-capacity. Clearly, roadway systems in the real world need more total aggregate capacity than the total aggregate demand, because the traffic does not always precisely match the available capacity. Consequently, the standard consumption-based model generally underestimates the full cost of growth. The consumption-based system is, however, a conservative, legally sound and relatively simple approach to the calculation of road impact fees.

A modification to the standard demand-driven road impact fee model has been developed that more accurately identifies the full growth-related cost of maintaining desired service levels, while avoiding the difficulties associated with the improvements-driven approach. Essentially, the idea is that new development should be required to pay for the cost to construct more capacity than it directly consumes in order to maintain the system-wide ratio of capacity to demand.

In the standard demand-driven model, the VMT generated by a development is multiplied by the cost per VMC of new roadway capacity to derive the impact fee. Implicit in this formula is the conversion of the cost per VMC to a cost per VMT. In other words, the standard model implicitly assumes that the ratio of VMC to VMT is one-to-one (cost/VMC x VMC/VMT = cost/VMT). The modified approach simply makes the VMC/VMT ratio implicit in the standard consumption-based system an explicit part of the formula. This modified consumption-based approach is the recommended approach for Lincoln. The recommended formula for the road impact fees is shown in Figure 3.

Figure 3
ARTERIAL STREET IMPACT FEE FORMULA

MAXIMUM FEE	=	VMT x NET COST/VMT
VMT	=	TRIPS x % NEW x LENGTH ÷ 2
NET COST/VMT	=	COST/VMT – CREDIT/VMT
COST/VMT	=	COST/VMC x VMC/VMT

<u>Where:</u>

VMT	=	Vehicle-miles of travel placed on the major roadway system during the afternoon peak hour
TRIPS	=	Trip ends during the afternoon peak hour on a weekday
% NEW	=	Percent of trips that are primary trips, as opposed to passby or diverted-link trips
LENGTH	=	Average length of a trip on major roadway system
÷ 2	=	Avoids double-counting trips for origin and destination
COST/VMC	=	Average cost to create a new vehicle-mile of capacity (VMC) in the major roadway system
VMC/VMT	=	The system-wide ratio of capacity to demand in the major roadway system
CREDIT/VMT	=	Revenue credit per VMT, based on state/federal and local funding anticipated to be available for capacity-expanding improvements to the major roadway system

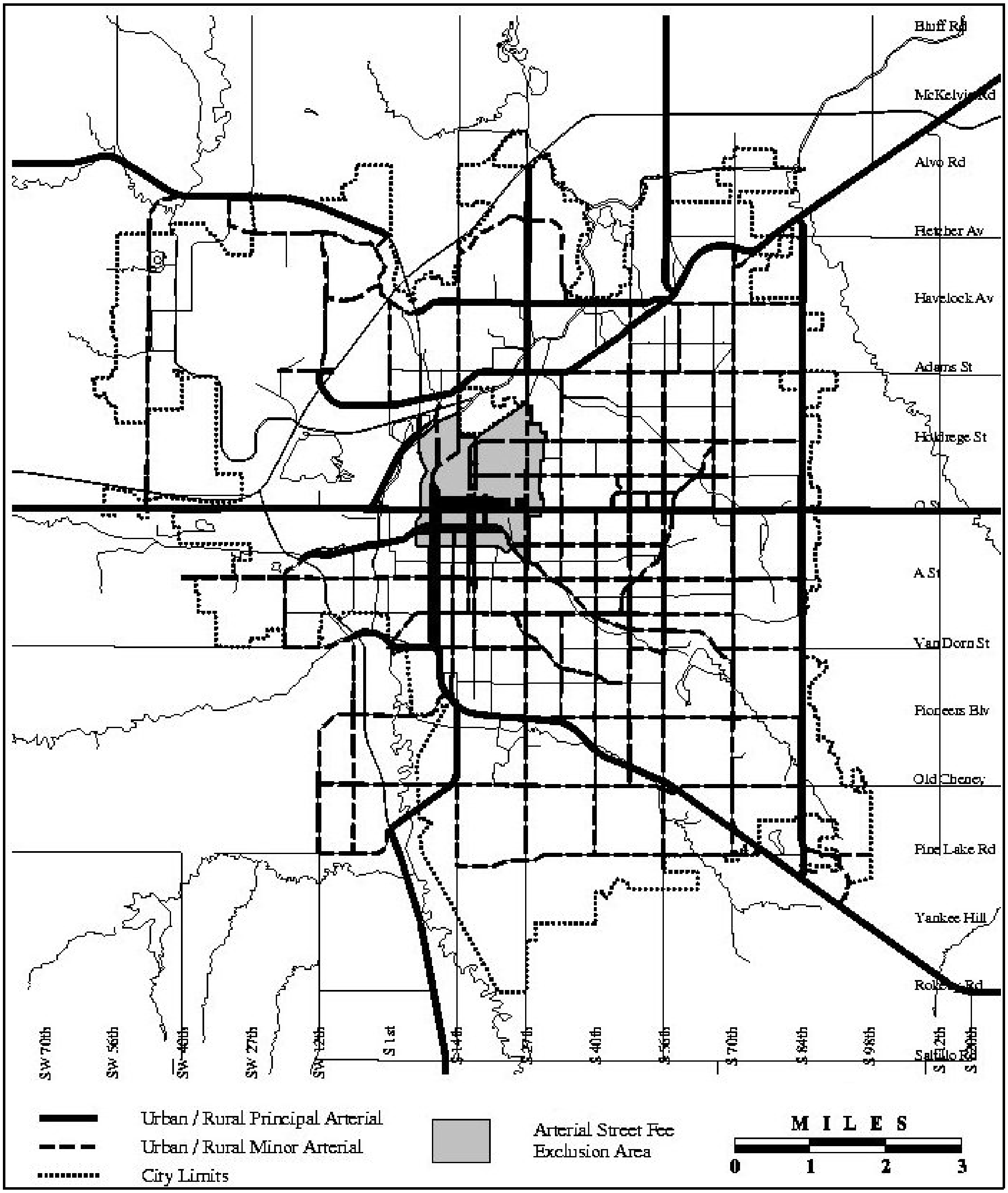
Major Roadway System

A road impact fee system should include a clear definition of the major roadway system that is to be funded with the impact fees. The major roadway system to be funded with the proposed arterial street impact fees consists of all "principal arterials" and "minor arterials" as defined in the existing functional classification system contained in the *2025 Lincoln/Lancaster County Comprehensive Plan*. The major roadway system excludes roadways classified as "interstate and expressway," consisting of I-80, I-180, and Highway 77. The major road system is illustrated in Figure 4.

An inventory of the existing major roadway system was compiled in order to identify existing capacity and to determine the average length of a trip on the major roadway system. The roadway segment descriptions include the street name, segment description (from-to), segment length, number of lanes, recent traffic volume and roadway capacity. Estimated average daily traffic volumes for the year 2000 were available for most segments from the Lincoln Public Works Department. Estimated capacities for each roadway segment were also provided by the Lincoln Public Works Department.

In most rapidly growing communities, some roadways will be experiencing an unacceptable level of congestion at any given point in time. One of the principles of impact fees is that new development should not be charged, through impact fees, for a higher level-of-service than is provided to existing

Figure 4
MAJOR ROAD SYSTEM



development. In the context of road impact fees, this has sometimes been interpreted to mean that impact fees should not be spent on roadways that are already over-capacity. A variant of this approach is that impact fees should only be used to fund a percentage of the project that can be attributed to providing additional capacity beyond what is needed to remedy any existing deficiency. There are a number of practical problems with these approaches. First, impact fees are restricted from being spent on roadways that are most in need of improvement, while the fact that fee-funded improvements to other roadways may also relieve the deficient segments is ignored. Second, these approaches can complicate impact fee administration by requiring that the portion of the cost of each improvement that is attributable to remedying deficiencies be funded from a different source than impact fees.

The most significant objection to these approaches, however, is that they are not consistent with the conservative nature of the consumption-based road impact fee methodology. The consumption-based system does not promise that no road segments will ever be over capacity. All the consumption-based model does is assume that for every unit of capacity that is consumed, another will be constructed to replace it. Implicitly, the level of service used in a consumption-based impact fee is a one-to-one ratio of capacity to demand in the major roadway system as a whole. As long as the current system provides at least this capacity/demand ratio, the impact fees are not charging for a higher level of service. As can be seen in Table 3, Lincoln's arterial system currently has 31 percent more capacity than existing demand on a system-wide basis. The data presented below exclude the capacity of and travel on major roadways located within the exclusion area.

Table 3
SYSTEM-WIDE RATIO OF CAPACITY TO DEMAND

Daily Vehicle-Miles of Capacity (VMC)	3,425,640
Daily Vehicle-Miles of Travel (VMT)	2,606,239
System-Wide Capacity/Demand Ratio	1.31

Source: Table 50 in the Appendix.

Cost per Service Unit

A critical step in the demand-driven methodology is to estimate the average cost to add a new lane-mile of capacity to the arterial system. Even in fringe areas prior to annexation, the arterial roadways are generally paved, two-lane rural roads. Expanding the capacity of the arterial system, then, is accomplished not by building brand new roads in cornfields, but by widening existing roads from two to four lanes or more. Rarely can the existing pavement be incorporated into the improved road; instead, the existing pavement must generally be removed before constructing the improved cross-section. Thus, expansion of Lincoln's arterial system is generally accomplished by building a new four-lane urban cross-section to replace a pre-existing rural or substandard two-lane section in order to add two additional lanes.

The cost to add capacity to Lincoln's arterial street system can be estimated based on the unit costs developed for the *Long Range Transportation Plan*. Excluding the highly variable components, such as bridges and environmental mitigation, the average construction cost for a four-lane arterial is estimated to be $3.26 million (see Table 4).

It should be noted that developers are currently required to make some of these improvements, such as installing sidewalks on adjacent arterials. By including these components in the fee, developers will either not be required to make these improvements, or else they will be given credit for the value of such improvements against the arterial street impact fee.

Table 4
ARTERIAL STREET COST PER MILE

Item	Unit	Units	Unit Cost	Total Cost
Pavement (12' lanes)	SF	253,440	$5.00	$1,267,200
Pavement (24 turn lanes*)	SF	57,600	$5.00	$288,000
Sidewalk (4' wide, both sides)	SF	42,240	$4.00	$168,960
Bike Trail (6' wider, one side, 1/4 mile)	SF	7,920	$5.25	$41,580
Landscaping in Median	LS	1	$50,000	$50,000
Full Intersection Traffic Signal	EA	3.5	$125,000	$437,500
Street Lights	EA	28	$3,000	$84,000
Storm Sewer	LS	1	$186,000	$186,000
Water Line Adjustments	LS	1	$59,000	$59,000
Waste Water Line Adjustments	LS	1	$2,500	$2,500
Box Culvert	EA	1	$75,000	$75,000
Retaining Walls	LS	1	$176,500	$176,500
Subtotal, Construction Cost per Mile, Four-Lane Arterial				$2,836,240
Design and Construction Inspection (15%)				$425,400
Total Cost per Mile, Four-Lane Arterial				$3,261,640

*four intersections per mile, each with right and dual left turn lanes in both directions, turn lanes 200'
Source: City of Lincoln Public Works Department, "Long Range Transportation Plan Roadway Cost," October 26, 2001 (costs exclude bridges, underground electric lines, and environmental mitigation).

Two additional steps are required to determine the cost per service unit (i.e., cost per VMT). First, a four-lane divided arterial has a peak hour capacity of about 3,200 trips, which represents an increase of 2,000 trips over the typical 1,200 capacity of a two-lane road. Dividing the cost per mile of a typical 2-lane to 4-lane widening project by the hourly capacity added yields an estimated cost of $1,631 per peak hour VMC, as shown in Table 5 below. Second, as noted earlier, the City's arterial system currently provides 1.31 VMC for every VMT, so the cost per VMC must be multiplied by this ratio to determine the cost per VMT.

Table 5
ARTERIAL STREET COST PER SERVICE UNIT

Average Cost per Mile, 2-Lane to 4-Lane Widening	$3,261,640
Average Hourly Capacity Added	2,000
Average Cost per Peak Hour Vehicle-Mile of Capacity	$1,631
System-wide VMC/VMT Ratio	1.31
Average Cost per Peak Hour Vehicle-Mile of Travel	$2,137

Source: Average cost per mile from Table 4; hourly capacity added from Lincoln Public Works Department; VMC/VMT ratio from Table 3.

Net Cost per Service Unit

In the calculation of the impact of new development on infrastructure costs, credit should be given for dedicated revenues or non-local funding that will be generated by new development and used to pay for capacity-related capital improvements. Credit should also be provided for property taxes or wheel taxes that will be paid by new development and used to retire outstanding debt for past arterial street improvements.

The City of Lincoln does not currently have any outstanding debt for arterial street improvements. Nor does the City use general fund monies to fund capacity-related arterial street improvements. The funding sources identified in the current CIP for capacity-related arterial street improvements are the wheel tax and state and federal highway funds. Over the next six years, the City has programmed over $100 million for capacity-expanding road projects in its CIP.

The first step in calculating a revenue credit for arterial streets is to divide the annual capacity-related capital funding from dedicated and non-local sources (which is virtually all of it in Lincoln) by the total number of service units (peak hour vehicle-miles of travel) on Lincoln's arterial system today. The City has programmed in its current six-year CIP about $97 million for roadway improvement projects that add lanes, improve intersections or otherwise expand the capacity of the major roadway system. This is the equivalent of spending about $62 annually for every peak hour vehicle-mile of travel on the City's arterial system during the average weekday. Assuming that as the city grows these revenue sources will increase proportionately, new development can be said to generate about $62 annually for each new service unit of travel demand it generates. Over the roughly 20-year useful life of road facilities, this is the equivalent of $770 per service unit (see Table 6).

Table 6
ARTERIAL STREET REVENUE CREDIT PER SERVICE UNIT

CIP No.	Description	Funding
3	Preliminary Engineering and Studies	$3,500,000
7	Install New Traffic Signals	$2,205,400
9	Traffic Optimization, Management and ITS	$3,340,700
11	Pine Lake Road Widening	$3,460,500
12	O Street/66th Street Widening	$14,448,400
13	70th St and 84th St Capacity Enhancement Study	$300,000
14	Antelope Valley Phase I Projects*	$27,444,800
15	84th St Widening	$1,731,300
16	84th St Widening	$4,465,000
17	Old Cheney Rd Widening	$3,804,300
18	14th Street Widening	$4,381,000
19	14th/Old Cheney Rd/Warlick Blvd Intersections	$3,622,900
20	56th Street Widening	$4,787,000
21	Pine Lake Road Widening	$4,034,700
26	Pine Lake Road Widening	$3,685,300
27	10th Street Widening	$2,879,400
28	S. 27th Street Widening	$1,810,700
29	Vine Street Widening	$1,500,000
30	Final Design, Easements and ROW	$3,500,000
31	Pioneers Blvd Widening	$1,763,700
Total Capacity-Related Road Funding, 2002-2007		$96,665,100
Years Covered by CIP		6
Annual Capacity-Related Road Funding		$16,110,850
Total Peak Hour Vehicle-Miles of Travel		260,624
Annual Capacity-Related Road Funding per VMT		$61.82
Present Value Factor (20 Years at 5% Discount Rate)		12.46
Present Value of Capacity-Related Road Funding per VMT		$770

* excludes Railroad Transportation Safety, Bridge Replacement and Train-Mile Tax funding
Source: Funding from City of Lincoln, *2002-2007 Capital Improvement Program*; total peak hour VMT is one-tenth daily VMT from Table 50.

Reducing the capital cost per service unit by the revenue credit calculated above yields a net capital cost of $1,367 per service unit, as shown in Table 7.

Table 7
ARTERIAL STREET NET COST PER SERVICE UNIT

Capital Cost per VMT	$2,137
Revenue Credit per VMT	$770
Net Cost per VMT	$1,367

Source: Capital cost per VMT from Table 5; revenue credit per VMT from Table 6.

Travel Demand

The travel demand generated by specific land use types is a product of three factors: 1) trip generation, 2) percent new trips and 3) trip length. The first two factors are well documented in the professional literature, and the average trip generation characteristics identified in studies of communities around the nation should be reasonably representative of trip generation characteristics in Lincoln. In contrast, trip lengths are much more likely to vary between communities, depending on the geographic size and shape of the community and its arterial street system.

Trip Generation

Trip generation rates were based on information published in the most recent edition of the Institute of Transportation Engineers' (ITE) *Trip Generation* manual. Trip generation rates represent trip ends, or driveway crossings at the site of a land use. Thus, a single one-way trip from home to work counts as one trip end for the residence and one trip end for the work place, for a total of two trip ends. To avoid over-counting, all trip rates have been divided by two. This splits the burden of travel equally between the origin and destination of the trip and eliminates double-charging for any particular trip.

New Trips Factor

Trip rates also need to be adjusted by a "new trip factor" to exclude pass-by and diverted-link trips. This adjustment is intended to reduce the possibility of over-counting by only including primary trips generated by the development. Pass-by trips are those trips that are already on a particular route for a different purpose and simply stop at a development on that route. For example, a stop at a convenience store on the way home from the office is a pass-by trip for the convenience store. A pass-by trip does not create an additional burden on the street system and therefore should not be counted in the assessment of arterial street impacts. A diverted-link trip is similar to a pass-by trip, but a diversion is made from the regular route to make an interim stop. The reductions for pass-by and diverted-link trips were drawn from published information.

Average Trip Length

The average trip length is the most difficult travel demand factor to determine. In the context of a road impact fee based on a consumption-based methodology, we are interested in determining the average length of a trip on the major roadway system within Lincoln. This can be approximated by dividing the total travel demand (VMT) on the major roadway system by the total number of trips generated by existing development in the service area. Both VMT and trips generated within the exclusion area are excluded.

Existing land uses in each of ten general categories have been multiplied by peak hour trip generation rates and summed to determine a reasonable estimate of total city-wide trips in the afternoon peak hour. Dividing total peak hour vehicle-miles of travel (VMT) on the major roadway system derived from the inventory by the estimated trips generated by existing land uses in Lincoln (outside the exclusion area) yields a reasonable estimate of the average distance traveled on the City's major roadway system per trip, as demonstrated in Table 8.

Table 8
AVERAGE TRIP LENGTH

Land Use	Units of Development	ITE Code	Existing Units	PM Pk Hr Trip Rate	PM Pk Hr Trips
Single-Family Detached	Dwelling	210	54,792	0.51	27,944
Multi-Family	Dwelling	220	32,563	0.31	10,095
Mobile Home	Dwelling	240	2,908	0.28	814
Retail	1,000 Sq. Ft.	820	9,865.127	1.37	13,515
Office	1,000 Sq. Ft.	710	5,768.696	0.75	4,327
Service	1,000 Sq. Ft.	710	7,299.030	0.75	5,474
Industrial	Acres	110	2,659	3.63	9,652
Elementary & Secondary School	Students	530	36,747	0.08	2,940
Community College	Students	540	5,380	0.09	484
University	Students	550	5,108	0.11	562
Total Peak Hour Trips from Existing Development					75,807
Total Peak Hour VMT on Major Roadway System					260,624
Average Trip Length, Miles					3.44

Source: 2001 dwelling units from Table 36 (multi-family shown above is sum of single-family attached, duplex, and multi-family in referenced table); nonresidential development estimates from Lincoln/Lancaster County Planning Department, 2001 Development Data Base (updated on April 30, 2001), excluding development within the exclusion area shown in Figure 1; trip rates are one-half of PM peak hour trip ends on a weekday reported in Institute of Transportation Engineers (ITE), *Trip Generation*, Sixth Edition (retail used rate for 500,000 sq. ft. shopping center adjusted for pass-by trips from Table 10); total peak hour VMT is one-tenth total daily VMT from Table 50.

The ratio of the average local trip length on Lincoln's major roadway system to the national average trip length identified in the U.S. Department of Transportation's 1995 *Nationwide Personal Transportation Survey* is computed in Table 9. Lincoln's average trip length on the major roadway system is lower than the national average because the major roadway system excludes travel on freeways, collectors and local streets, and all roads outside the city limits. Using this ratio, reasonable trip lengths were derived for specific trip purposes, including home-to-work trips, shopping, school/church and other personal trips, as shown in Table 9.

Table 9
AVERAGE TRIP LENGTH BY TRIP PURPOSE

Trip Purpose	National Data	Local Data	Local Ratio	Est. Local Trip Lengths
To or from work	11.73		0.39	4.6
Doctor/Dentist	9.23		0.39	3.6
Average	8.92	3.44	0.39	3.5
School/Church	8.05		0.39	3.1
Family/Personal	6.88		0.39	2.7
Shopping	5.61		0.39	2.2

Source: Average trip lengths in miles; national data from US. Department of Transportation, *Nationwide Personal Transportation Survey*, 1995 (http://www-cta.ornl.gov/npts/1995/ Doc/table1.pdf); local average trip length from Table 8; estimated local trip lengths are products of national data by ratio.

Peak hour travel demand must be estimated for a variety of land uses in order to develop a net cost schedule. The result of combining trip generation rates, new trip factors and average trip lengths is a travel demand schedule that establishes the vehicle-miles of travel (VMT) during the evening peak hour generated by various land use types per unit of development. The recommended travel demand schedule is presented in Table 10.

Table 10
TRAVEL DEMAND SCHEDULE

Land Use Type	ITE Code	Unit	Trip Rate	% New Trips	Length (miles)	Pk Hr VMT
Single-Family Detached	210	Dwelling	0.51	100%	4.6	2.35
Single-Family Attached/Duplex	230	Dwelling	0.27	100%	4.6	1.24
Multi-Family	220	Dwelling	0.31	100%	4.6	1.43
Multi-Family Elderly/Retirement	250	Dwelling	0.14	100%	2.7	0.36
Mobile Home Park	240	Dwelling	0.28	100%	4.6	1.29
RETAIL/COMMERCIAL						
Hotel/Motel	310	Room	0.31	100%	2.7	0.84
Gen Retail/Shop Ctr (<100,000 sf)	820	1000 sq. ft.	3.14	61%	1.8	3.45
Gen Retail/Shop Ctr (100,000-299,999 sf)	820	1000 sq. ft.	2.16	72%	2.0	3.11
Gen Retail/Shop Ctr (300,000-499,999 sf)	820	1000 sq. ft.	1.82	75%	2.2	3.00
Gen Retail/Shop Ctr (500,000-999,999 sf)	820	1000 sq. ft.	1.44	80%	2.4	2.76
Gen Retail/Shop Ctr (1 million sf+)	820	1000 sq. ft.	1.25	82%	2.6	2.67
Bank	912	1000 sq. ft.	27.39	27%	0.9	6.66
Convenience Store with Gasoline Sales	853	1000 sq. ft.	30.30	16%	0.9	4.36
Movie Theater	444	1000 sq. ft.	1.90	50%	2.7	2.57
Restaurant, Fast Food	834	1000 sq. ft.	16.74	27%	0.9	4.07
Restaurant, Sit-Down	831	1000 sq. ft.	3.75	38%	2.7	3.85

Land Use Type	ITE Code	Unit	Trip Rate	% New Trips	Length (miles)	Pk Hr VMT
OFFICE/INSTITUTIONAL						
Office, General	710	1000 sq. ft.	0.75	100%	4.6	3.45
Office, Medical	720	1000 sq. ft.	1.83	100%	3.6	6.59
Hospital	610	1000 sq. ft.	0.46	100%	3.6	1.66
Nursing Home	620	1000 sq. ft.	0.18	100%	3.6	0.65
Church	560	1000 sq. ft.	0.33	100%	3.1	1.02
Day Care Center	565	1000 sq. ft.	6.60	24%	2.7	4.28
Elementary/Secondary School	565	1000 sq. ft.	0.51	24%	3.1	0.38
INDUSTRIAL						
Light Industrial/Industrial Park	130	1000 sq. ft.	0.46	100%	4.6	2.12
Manufacturing	140	1000 sq. ft.	0.37	100%	4.6	1.70
Warehouse	150	1000 sq. ft.	0.26	100%	4.6	1.20
Mini-Warehouse	151	1000 sq. ft.	0.13	100%	2.7	0.35
RECREATIONAL						
Amusement Park	480	Acre	1.98	100%	2.7	5.35
Bowling Alley	494	1000 sq. ft.	1.77	100%	2.7	4.78
Golf Course	430	Hole	1.37	100%	2.7	3.70
Golf Driving Range	432	Tee	0.63	100%	2.7	1.70
Health Club	493	1000 sq. ft.	2.15	50%	2.7	2.90
Miniature Golf Course	431	Hole	0.17	100%	2.7	0.46
Park	412	Acre	0.20	100%	2.7	0.54

Source: Trip rate is ½ trip ends during PM peak hour of adjacent street on a weekday, Institute of Transportation Engineers (ITE), *Trip Generation*, 6th ed., 1997; shopping center rates based on upper end of range; new trip percentages for most uses from ITE, *Trip Generation Handbook,* October 1998; day care center from paper by Hitchens, 1990 ITE Compendium; elementary/secondary school assumed same as for day care; health club new trip percentage assumed; average trip lengths from Table 9; shopping center average trip length reduced from average retail trip length for centers smaller than 300,000 square feet and increased for centers larger than 500,000 square feet; highest trip generating uses assumed one-half trip length of smallest shopping center.

Net Cost Schedule

Multiplying the net cost per VMT by the peak hour travel demand generated by various land use types results in an estimate of the net capital cost of arterial street improvements to serve new development, shown in Table 11 for a range of land use types. Developers who believe their project will have less impact on Lincoln's arterial system than indicated by the fee schedule will have the option of conducting an individual fee assessment. In addition, some developers will receive credit against the fees for required improvements to the arterial system.

Table 11
ARTERIAL STREET NET COST SCHEDULE

Land Use Type	Unit	Pk Hr VMT	Net Cost/ VMT	Net Cost/ Unit
Single-Family Detached	Dwelling	2.35	$1,367	$3,212
Duplex/Single-Family Attached	Dwelling	1.24	$1,367	$1,695
Multi-Family	Dwelling	1.43	$1,367	$1,955
Multi-Family Elderly/Retirement	Dwelling	0.36	$1,367	$492
Mobile Home Park	Dwelling	1.29	$1,367	$1,763
RETAIL/COMMERCIAL				
Hotel/Motel	Room	0.84	$1,367	$1,148
Gen Retail/Shopping Ctr (<100,000 sf)	1000 sq. ft.	3.45	$1,367	$4,716
Gen Retail/Shopping Ctr (100,000-299,999 sf)	1000 sq. ft.	3.11	$1,367	$4,251
Gen Retail/Shopping Ctr (300,000-499,999 sf)	1000 sq. ft.	3.00	$1,367	$4,101
Gen Retail/Shopping Ctr (500,000-999,999 sf)	1000 sq. ft.	2.76	$1,367	$3,773
Gen Retail/Shopping Ctr (1 million sf+)	1000 sq. ft.	2.67	$1,367	$3,650
Bank	1000 sq. ft.	6.66	$1,367	$9,104
Convenience Store with Gasoline Sales	1000 sq. ft.	4.36	$1,367	$5,960
Movie Theater	1000 sq. ft.	2.57	$1,367	$3,513
Restaurant, Fast Food	1000 sq. ft.	4.07	$1,367	$5,564
Restaurant, Sit-Down	1000 sq. ft.	3.85	$1,367	$5,263
OFFICE/INSTITUTIONAL				
Office, General	1000 sq. ft.	3.45	$1,367	$4,716
Office, Medical	1000 sq. ft.	6.59	$1,367	$9,009
Hospital	1000 sq. ft.	1.66	$1,367	$2,269
Nursing Home	1000 sq. ft.	0.65	$1,367	$889
Church	1000 sq. ft.	1.02	$1,367	$1,394
Day Care Center	1000 sq. ft.	4.28	$1,367	$5,851
Elementary/Secondary School	1000 sq. ft.	0.38	$1,367	$519
INDUSTRIAL				
Light Industrial/Industrial Park	1000 sq. ft.	2.12	$1,367	$2,898
Manufacturing	1000 sq. ft.	1.70	$1,367	$2,324
Warehouse	1000 sq. ft.	1.20	$1,367	$1,640
Mini-Warehouse	1000 sq. ft.	0.35	$1,367	$478
RECREATIONAL				
Amusement Park	Acre	5.35	$1,367	$7,313
Bowling Alley	1000 sq. ft.	4.78	$1,367	$6,534
Golf Course	Hole	3.70	$1,367	$5,058
Golf Driving Range	Tee	1.70	$1,367	$2,324
Health Club	1000 sq. ft.	2.90	$1,367	$3,964
Miniature Golf Course	Hole	0.46	$1,367	$629
Park	Acre	0.54	$1,367	$738

Source: Peak hour vehicle-miles of travel per unit from Table 10; net cost per VMT from Table 5.

WATER

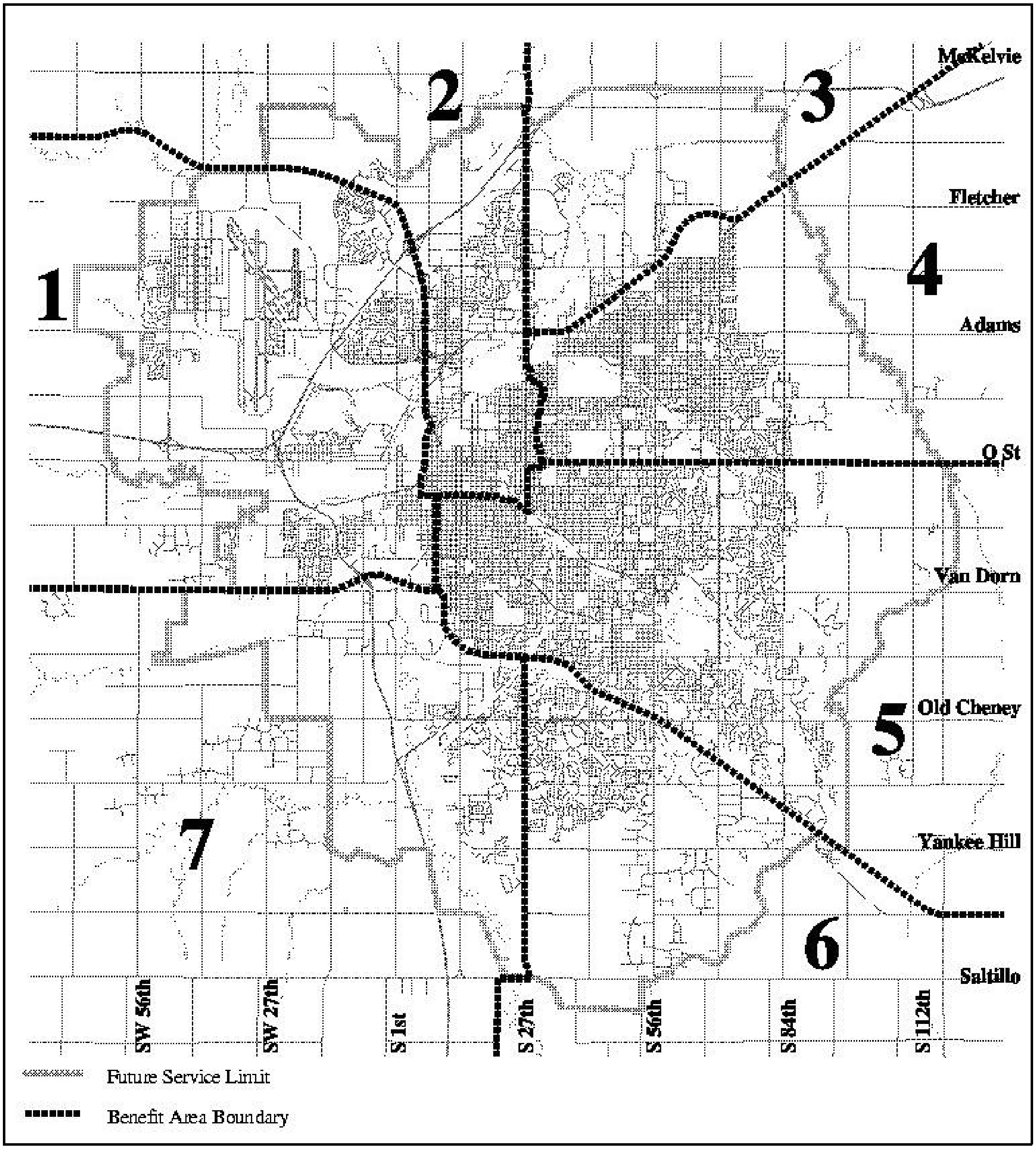
Most of the City's water supply comes from a 1,600-acre well field along the Platte River near Ashland, Nebraska. The water enters the city from the northeast through a supply line capable of transmitting 108 million gallons per day (mgd). Because the primary source of water is so far away, the City has more storage capacity than most communities, equal to approximately one peak day's demand. This section calculates maximum impact fees for two types of water facilities: system facilities and distribution mains.

Service Area

A service area is an area subject to a uniform fee schedule. It is recommended that the City's entire water service area should be treated as a single impact fee service area. A single service area can be justified from several perspectives. First, from the perspective of an individual customer, the lay-out of the utility system and the customer's geographic relationship to components of the system, including location of treatment plants, size and placement of lines, and so forth, are discretionary decisions made by the utility. Moreover, water systems are designed with features to ensure system-wide reliability. This is illustrated by the fact that special mains are often installed to allow treatment facilities to serve several areas. Also, many systems are "looped" to provide redundant distribution facilities. These system reliability aspects make it difficult or impossible to assign certain costs by geographic area. Additionally, there are facilities that serve various geographic areas and therefore present geographically unallocatable costs. Finally, the utility's entire rate revenue is pledged as security for the repayment of revenue bonds, making it impossible to allocate debt payment costs to subgroups of customers. In summary, because (1) many siting and design decisions are discretionary rather than locational; (2) systems are often designed with redundant facilities for system reliability; (3) some facilities have no geographic-specific service area; and (4) revenue bonds are backed by system-wide revenues, it can be argued that each utility operates as a complete, integrated system. Therefore, any customer who receives service from such a system may reasonably be considered to be receiving sufficient benefit from the payment of an impact fee, thus meeting the benefit nexus of the rational nexus test.

While the fees will be calculated city-wide, the City intends that the water distribution impact fees be earmarked and spent in the subarea in which they are collected. Seven water distribution impact fee benefit areas have been proposed, as illustrated in Figure 5. Water system impact fee fees could be spent anywhere in the service area.

Figure 5
WATER DISTRIBUTION BENEFIT AREAS



Service Unit

A water utility must be able to supply water to satisfy demand that fluctuates over a wide range. Yearly, monthly, daily and hourly variations must all be accommodated. Water demand rates most important to the design and operation of a water system are average day, maximum day and maximum hour. The allocation of capital costs in this analysis is based on maximum day water demand.

To calculate water impact fees, the water demand associated with different types of customers must be expressed in a common unit of measurement, called a "service unit." Water system components must be designed to meet peak demand. Consequently, water impact fees should reflect maximum potential demand, which is determined by the capacity of the water meter. This can be accomplished by developing factors that convert each meter size into multiples of a "Single-Family Equivalent" meter, or SFE. An SFE is a common denominator that converts all classes of customers into a common unit of expression. An SFE is the water demand associated with the meter typically used by a single-family residence. While the smallest water meter currently in use is the 5/8" by 3/4" meter, these meters are no longer used for new customers, for whom the smallest available meter is now the 3/4" meter. Existing customers with 5/8" by 3/4" meters will be classified with 3/4" meters for the purpose of this analysis. Based on existing customers by meter size and meter capacities, there are an estimated 101,654 SFEs currently being served by Lincoln's water utility, as shown in Table 12.

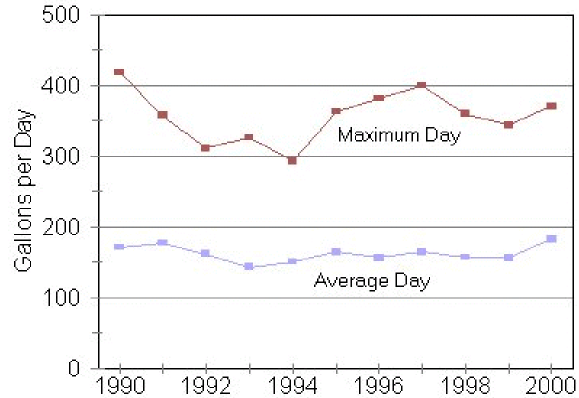
Table 12
EXISTING WATER SERVICE UNITS

Meter Size	Capacity (gpm)	SFEs/ Meter	Existing Customers	SFEs
5/8" x 3/4"	10	1.00	22,638	22,638
3/4"	15	1.00	37,033	37,033
1"	25	1.67	8,415	14,053
1-1/2"	50	3.33	935	3,114
2"	80	5.33	949	5,058
3"	160	10.67	351	3,745
4"	250	16.67	177	2,951
6"	500	33.33	203	6,766
8"	800	53.33	85	4,533
10"	1,150	76.67	23	1,763
Total SFEs				101,654

Source: Meter capacities are maximum continuous duty flow rates from American Water Works Association; SFEs per meter is ratio of capacity to capacity of 3/4" meter; existing customers from Lincoln Public Works Department, October 5, 2001 memorandum.

The cost of the capacity needed to serve an additional single-family equivalent customer is dependent on the average demand for water. Per capita water usage can fluctuate significantly from one year to the next, dependent largely on the amount of rainfall and thus the need for irrigation of lawns. This fluctuation is even more marked for maximum day demand than it is for average day demand (see Figure 6).

Figure 6
WATER DEMAND PER PERSON



In order to establish the average long-term demand, water consumption data from the last ten years was examined. As shown in Table 13, average water demand per service unit has averaged 359 gallons per day over the last ten years. The ratio of maximum to average day demand has approached the 2.5 figure used in the City's water master plan on three occasions during the ten year period. Since facilities must be sized for maximum demand conditions, this ratio is applied to the average daily demand per service unit over the ten-year period to determine the maximum water demand per service unit, as shown in Table 13.

Table 13
WATER DEMAND PER SERVICE UNIT

	Daily Demand (mgd)					Average
Year	Average	Maximum	Ratio	Population	SFEs	gpd/SFE
1990	32.8	80.3	2.45	191,972	86,474	379
1991	34.6	69.7	2.01	195,333	87,988	393
1992	31.9	61.7	1.93	198,694	89,502	356
1993	28.9	65.8	2.28	202,055	91,016	318
1994	31.0	59.9	1.93	205,416	92,530	335
1995	34.2	75.7	2.21	208,777	94,044	364
1996	33.1	80.8	2.44	212,138	95,558	346
1997	35.3	86.0	2.44	215,499	97,072	364
1998	34.3	78.5	2.29	218,860	98,586	348
1999	34.7	76.3	2.20	222,221	100,100	347
2000	41.1	83.5	2.03	225,581	101,654	404
Average Daily Demand (gpd) per SFE						359
Ratio of Maximum Day to Average Daily Demand						2.50
Maximum Day Demand (gpd) per SFE						898

Source: Average and maximum daily water demand from Lincoln Public Works Department, October 11, 2001 memorandum; 1990 and 2000 population of City of Lincoln from U.S. Census Bureau; year 2000 SFEs from Table 12; SFEs for other years based on ratio of 2.22 persons per SFE from year 2000; ratio of maximum to average day demand from Black & Veatch, *Water Distribution System Master Plan Report for Lincoln Water System*, December 1995.

Cost per Service Unit

The capital facilities required to provide water service include water supply, treatment, transmission mains, pumping, storage reservoirs and distribution mains.

Treatment and Transmission Facilities

In the early 1990s, the City made a major investment in expanding its water production facilities near Ashland, as well as in the 15 miles of transmission lines to carry that water to the city. The current maximum capacity of these production, treatment and transmission facilities is about 108 mgd. The current capacity falls between the maximum water demand projections contained in the City's 1995 water distribution master plan of 102 mgd in 2000 and 115 mgd in 2010, indicating that the City currently has sufficient capacity but will need to expand that capacity in the not-to-distant future.

City Public Works staff and the City's consultant engineers estimate that the cost to expand the City's water production and treatment capacity is about $1.25 per gallon of maximum daily capacity. They also estimate the current cost of the 54-inch transmission lines to be about $300 per foot. These cost estimates do not include the cost of land or easements. Dividing the current cost of the City's existing production, treatment and transmission facilities by their capacity results in an estimated cost of $1.47 per gallon per day of water demand. Multiplying this by the maximum day water demand per service unit yields a water treatment and supply cost of $1,320 per single-family unit or equivalent, as shown in Table 14.

Table 14
WATER TREATMENT AND SUPPLY COST

Current Cost of Production and Treatment Facilities	$135,000,000
Current Cost of Ashland Transmission Lines	$23,760,000
Total Cost of Ashland Water Treatment and Supply Facilities	$158,760,000
Production and Transmission Line Capacity (gpd)	108,000,000
Water Treatment and Supply Cost per gpd	$1.47
Maximum Day Demand per SFE (gpd)	898
Water Treatment and Supply Cost per SFE	$1,320

Source: Cost of Ashland water plant assets based on approximate capacity of 108 mgd and current cost of $1.25 per gpd from Lincoln Public Utilities Administrator, December 20, 2001 memorandum; transmission line cost of 15-mile lines based on approximate cost of $300 per foot from Lincoln Public Utilities Administrator, December 20, 2001 memorandum; transmission line capacity from Black & Veatch, *Water Distribution System Master Plan Report for Lincoln Water System*, December 1995; maximum day demand per SFE from Table 13.

Water Storage Reservoirs

The water system currently provides 969 gallons of storage capacity per single-family customer or equivalent. This is slightly higher than the 963 gallons per SFE indicated as needed by the year 2010 in the City's water master plan, as shown in Table 15. This indicates that there is no significant deficiency or excess capacity in the City's current water storage facilities. The slightly lower long-term ratio from the master plan will be used in calculating the water storage portion of the water impact fee.

Table 15
WATER STORAGE CAPACITY

Storage Facility	2001	2010
Vine St Reservoir Capacity (mg)	20.0	20.0
Pioneers Park Reservoir Capacity (mg)	4.0	4.0
S 56th St Reservoir Capacity (mg)	4.0	8.0
Southeast Reservoir Capacity (mg)	5.0	5.0
"A" St Reservoir Capacity (mg)	32.0	32.0
Air Park Reservoir Capacity (mg)	3.0	3.0
NW 12th St Reservoir Capacity (mg)	4.5	3.0
Pine Lake Reservoir Capacity (mg)	4.0	8.0
51st St Reservoir Capacity (mg)	12.0	12.0
Northeast Reservoir Capacity (mg)	10.0	10.0
Total Capacity (mg)	98.5	105.0
Single-Family Equivalents (SFEs)	101,654	109,009
Storage Capacity per SFE (gallons)	969	963

Source: 2001 capacities from Lincoln Public Works, October 5, 2001; 2010 capacities from Black & Veatch, *Water Distribution System Master Plan Report for Lincoln Water System*, December 1995; 2001 SFEs from Table 12; 2010 SFEs based on 2010 population projection of 242,000 from master plan divided by 2.22 persons per SFE derived from Table 12.

The City has constructed three new storage reservoirs in recent years, and these provide a reasonable guide to the average cost of adding storage capacity to the system, as shown in Table 16.

Table 16
WATER STORAGE COST PER GALLON

Facility	Year Built	Original Cost	Inflation Factor	Current Cost	Capacity (mg)	Cost/ gallon
Vine Street Reservoir	2001	$6,700,000	1.019	$6,827,300	10.0	$0.68
NW 12th St. Reservoir	1998	$2,550,000	1.092	$2,784,600	4.5	$0.62
Northeast Reservoir	1997	$5,100,000	1.109	$5,655,900	5.0	$1.13
Total		$14,350,000		$15,267,800	19.5	$0.78

Source: Year built, original cost and capacity from Lincoln Public Works, October 5, 2001 memorandum; inflation factor based on *Engineering News-Record* Construction Cost Index for January 2002 from www.enr.com.

Multiplying the average cost per gallon of new storage capacity by the storage capacity required per SFE yields the storage cost per service unit, as summarized in Table 17.

Table 17
WATER STORAGE COST PER SERVICE UNIT

Cost per Gallon of Storage Capacity	$0.78
Gallons of Storage Capacity per SFE	963
Water Storage Cost per SFE	$751

Source: Cost per gallon from Table 16; gallons per SFE from Table 15.

Pumping Stations

The City's water system currently has 377.1 million gallons per day (mgd) of installed pumping station capacity, which works out to 3,710 gpd per single-family equivalent customer. The City's water master plan indicated a long-term need for slightly more pumping capacity per service unit, as shown in Table 18. The portion of the water impact fee for pumping capacity will be based on the existing ratio of capacity to service units.

Table 18
WATER PUMPING CAPACITY

Pumping Facility	2001	2010
51st St Pumping Station Capacity (mgd)	70.0	89.0
Northeast Pumping Station Capacity (mgd)	85.0	110.0
"A" St Pumping Station Capacity (mgd)	63.0	63.0
Vine St Pumping Station Capacity (mgd)	95.0	95.0
Belmont Pumping Station Capacity (mgd)	21.2	26.6
Merrill Pumping Station Capacity (mgd)	7.4	7.4
Southeast Pumping Station Capacity (mgd)	21.5	26.8
56th Pine Lake Rd Pumping Station Capacity (mgd)	9.0	n/a
Cheney Booster Capacity (mgd)	5.0	n/a
Total Capacity (mgd)	377.1	417.8
Single-Family Equivalents (SFEs)	101,654	109,009
Pumping Capacity per SFE (gpd)	3,710	3,833

Source: Existing capacity from Lincoln Public Works Department, October 5, 2001 memorandum; 2010 capacity from Black & Veatch, *Water Distribution System Master Plan Report for Lincoln Water System*, December 1995; SFEs from Table 15.

The City has constructed four new pumping facilities in recent years, and these provide a reasonable guide to the average cost of adding capacity to the system, as shown in Table 19.

Table 19
WATER PUMPING COST PER GALLON PER DAY

Facility	Year Built	Original Cost	Inflation Factor	Current Cost	Capacity (mgd)	Cost/ gpd
Northeast	1997	$1,500,000	1.109	$1,663,500	20.0	$0.083
Vine Street	2001	$2,800,000	1.019	$2,853,200	20.0	$0.143
56th Pine Lake Rd	1998	$1,200,000	1.092	$1,310,400	9.0	$0.146
Cheney Booster	2001	$550,000	1.019	$560,450	5.0	$0.112
Total		$6,050,000		$6,387,550	54.0	$0.118

Source: Year built, original cost and capacity from Lincoln Public Works, October 5, 2001 memorandum; inflation factor based on *Engineering News-Record* Construction Cost Index for January 2002 from www.enr.com.

Multiplying the average cost per gallon per day of new pumping capacity by the capacity required per SFE yields the pumping cost per service unit, as summarized in Table 20.

Table 20
WATER PUMPING COST PER SERVICE UNIT

Cost per Gallon per Day of Pumping Capacity	$0.118
Gallons per Day of Pumping Capacity per SFE	3,710
Water Pumping Cost per SFE	$438

Source: Cost per gpd from Table 19; gpd per SFE from Table 19.

Water Distribution Mains

Water lines within a development are installed at the developer's expense. When line extensions are needed to serve new development, or when larger lines are needed within a development in order to serve other developments, the developer pays for the size line needed to serve the subdivision and the City pays for the cost of oversizing pipes. In general, lines 16 inches in diameter or smaller are considered tappable mains, and a portion of the cost of such lines will often be paid for by developers. For this reason, lines smaller than 16 inches are excluded from the impact fees. Once the impact fees are in place, developers who are required to pay for all or a portion of the extension of a line 16 inches in diameter or larger will be eligible for credit against their water impact fees.

The City's existing system contains about 226 miles of water lines 16 inches and larger. The cost of installing this amount of pipe in undeveloped areas at today's prices would total about $159 million, as shown in Table 21.

Table 21
MAJOR WATER LINE COST

Pipe Diameter	Length (feet)	Cost/ Foot	Current Value
54"	11,000	$270	$2,970,000
48"	156,000	$240	$37,440,000
36"	236,000	$180	$42,480,000
30"	32,000	$150	$4,800,000
24"	230,000	$120	$27,600,000
20"	41,000	$100	$4,100,000
16"	490,000	$80	$39,200,000
Total	1,196,000		$158,590,000

Source: Pipe size, length and cost per foot from memo from Lincoln Public Utilities, October 5, 2001 memorandum.

Dividing the total current cost of existing major distribution lines by the number of existing service units served by those lines yields the distribution line cost per service unit, as summarized in Table 22.

Table 22
WATER DISTRIBUTION COST PER SERVICE UNIT

Current Cost of Existing Major Distribution Lines	$158,590,000
Existing Water Service Units (SFEs)	101,654
Water Distribution Cost per SFE	$1,560

Source: Distribution line cost from Table 21; existing SFEs from Table 12.

Cost per Service Unit Summary

In summary, it will cost approximately $4,069 to construct the capital facilities to accommodate an additional single-family unit, as shown in Table 23.

Table 23
WATER COST PER SERVICE UNIT

Treatment Plant/Transmission Cost per SFE	$1,320
Storage Reservoir Cost per SFE	$751
Pumping Station Cost per SFE	$438
Subtotal, Water System Cost per SFE	$2,509
Distribution Main Cost per SFE	$1,560
Total Water System Cost per SFE	$4,069

Source: Treatment plant cost from Table 14; storage reservoir cost from Table 17; pumping station cost from Table 20; distribution main cost from Table 22.

Net Cost per Service Unit

The analysis above has estimated the actual capital cost required to accommodate an additional service unit or single-family detached dwelling at the existing level of service provided to current water customers. However, new water customers will be paying for some of the cost through their rates that will be used to retire existing debt on the water system. Dividing the amount of outstanding debt on the water system by current water customers (expressed in terms of single-family equivalents) provides a reasonable estimate of the amount that new customers will be paying. In effect, this approach puts new customers on an equal footing with current customers, allowing them to pay for the same share of their capital costs through rates. As shown in Table 24, the debt service credit amounts to $400 per single-family dwelling or equivalent.

Table 24
WATER DEBT SERVICE CREDIT PER SERVICE UNIT

Outstanding Water System Debt	$40,690,000
Existing Single-Family Equivalents (SFEs)	101,654
Debt Service Credit per SFE	$400

Source: Outstanding water system debt principal as of August 31, 2001 from Lincoln Public Works and Utilities Department, October 5, 2001 memorandum; existing SFEs from Table 12.

Reducing the cost per service unit or single-family unit by the amount of the debt service credit calculated above results in the estimated net cost per service unit or single-family dwelling. As shown in Table 25, the net cost to accommodate growth in customers is estimated to be $3,669 per new single-family customer. Allocating the credit between system and distribution costs proportional to cost results in the following net costs for system and distribution facilities.

Table 25
WATER NET COST PER SERVICE UNIT

	System	Distribution	Total
Water System Capital Cost per SFE	$2,509	$1,560	$4,069
Water Debt Service Credit per SFE	$247	$153	$400
Water Net Capital Cost per SFE	$2,262	$1,407	$3,669

Source: Capital cost from Table 23; debt service credit from Table 24.

As described earlier, a water service unit represents the water demand of a typical single-family connection, which is a 3/4-inch meter. The number of service units associated with larger meters are based on the relative hydraulic capacity of the meter compared to the smallest meter size. Multiplying the service units associated with each meter size by the net cost per service unit calculated above gives the net costs per water meter for meters of various sizes, as shown in Table 30. These represent the maximum water impact fees that can be assessed by the City of Lincoln based on the data, assumptions and methodology presented in this report.

Table 26
WATER NET COST PER METER

Meter Size	SFEs/ Meter	System Net Cost per SFE	System Net Cost per Meter	Distribution Net Cost per SFE	Distribution Net Cost per Meter	Total Net Cost/ Meter
3/4"	1.00	$2,262	$2,262	$1,407	$1,407	$3,669
1"	1.67	$2,262	$3,778	$1,407	$2,350	$6,128
1-1/2"	3.33	$2,262	$7,532	$1,407	$4,685	$12,217
2"	5.33	$2,262	$12,056	$1,407	$7,499	$19,555
3"	10.67	$2,262	$24,136	$1,407	$15,013	$39,149
4"	16.67	$2,262	$37,708	$1,407	$23,455	$61,163
6"	33.33	$2,262	$75,392	$1,407	$46,895	$122,287
8"	53.33	$2,262	$120,632	$1,407	$75,035	$195,667
10"	76.67	$2,262	$173,428	$1,407	$107,875	$281,303

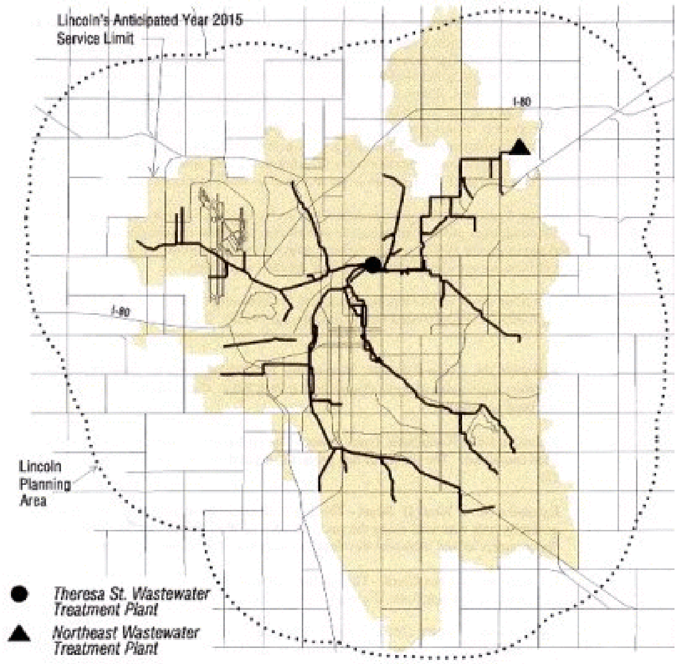
Source: SFEs per meter from Table 12; net costs per SFE from Table 25.

WASTEWATER

Lincoln has been served by a public wastewater collection system since 1888. The collection system was operated by Sanitary District No. 1 of Lancaster County, which was created by the state legislature in 1891, until it was taken over by the City in 1957. The present collection system serves 12 major drainage basins and includes over 860 miles of sanitary sewer pipes ranging from 6 to 90 inches in diameter.

Wastewater generated in Lincoln is currently treated at the City's two wastewater treatment plants. The Theresa Street Wastewater Treatment Plant is centrally located; the Northeast Wastewater Treatment Plant is located at the northeastern edge of the city. The Theresa Street plant is currently treating an average annual flow of about 19 million gallons per day (mgd). The Northeast plant is currently treating an average annual flow of about 6.5 mgd.

Figure 7
EXISTING WASTEWATER FACILITIES



The Theresa Street facility occasionally exceeds its permitted discharge limits for organic waste strength due to periods of high volume, high strength organic wastes discharged from several large industries. Improvements are currently underway to provide additional oxidative capacity for treatment of such high strength wastes. Improvements to both plants to meet new National Pollution Discharge Elimination System (NPDES) permit limits for ammonia are currently estimated at $20 to $25 million. However, no costs of upgrading treatment levels are included in the impact fees, because such costs are not attributable to growth and should properly be borne by all ratepayers.

In several areas of the city, the trunk sewer systems are approaching or have already exceeded their capacity to transport peak sewage flows during severe rainfall events. In particular, the Salt Creek basin requires additional capacity. A new gravity relief sewer is currently under phased construction to provide additional capacity in this area.

Service Area

As with the water system, it is recommended that the City’s entire wastewater service area should be treated as a single impact fee service area. The arguments in favor of a single service area, similar to those discussed in the water section, can be summarized as follows: (1) wastewater treatment facilities and major trunk sewers serve large geographical areas; and (2) revenue bonds are backed by system-wide revenues. Therefore, a new customer who receives service from this system may reasonably be considered to be receiving sufficient benefit from the payment of an impact fee to meet the benefit portion of the rational nexus test.

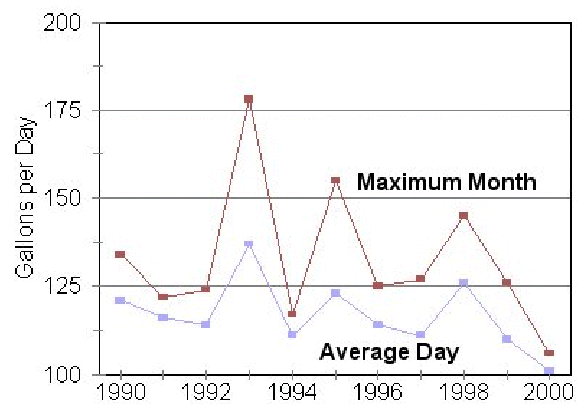
Service Unit

To calculate wastewater impact fees, the wastewater generation associated with different types of customers must be expressed in a common unit of measurement, called a "service unit." Wastewater impact fees, like water impact fees, will be based on the size of the water meter. As with the water fee, the service unit will be the wastewater demand associated with the smallest water meter, which is referred to as a "Single-Family Equivalent," or SFE.

There are a number of parameters that are used in wastewater system design. The average daily flow that passes through a wastewater treatment facility on an annual basis is called the average annual flow (AAF). AAF is used to determine long-term planning requirements. The highest monthly flow, on a 30-day average, is defined as the maximum month flow (MMF). MMF is used in combination with maximum month biological oxygen demand to determine the design capacity of the organic treatment components. The maximum hourly flow entering the treatment facility at any time during the period of record is defined as the peak wet weather flow (PWWF). PWWF is the total wastewater flow that occurs at the facility during precipitation events such as rain or snow storms, and includes dry weather infiltration as well as direct stormwater inflow (infiltration/inflow or I/I). Even though considerable effort has been made to reduce I/I, large storms still exert a significant impact on the maximum flows at Lincoln's two treatment facilities. PWWF is used to determine the maximum hydraulic capacity of pipelines, lift stations and various treatment units of the overall collection and treatment system. For the purpose of this analysis, the cost of wastewater facilities will be allocated to new development based on its contribution to average annual flow.

The cost of the capacity needed to serve an additional single-family equivalent customer is dependent upon the average generation of wastewater. Per capita wastewater flows to the treatment plant can fluctuate significantly from one year to the next, dependent largely on the amount of rainfall and the amount of I/I into the sewer collection system. This fluctuation is much more dramatic for maximum month flow than it is for average daily flow (see Figure 8).

Figure 8
WASTEWATER FLOW PER PERSON



In order to establish the average long-term demand, wastewater flow data from the last ten years was examined. As shown in Table 27, average wastewater flow per service unit has averaged 259 gallons per day over the last ten years. While the City's wastewater master plan does not express demand in terms of SFEs, the comparison can be made on a per capita basis. Over the last ten years, the wastewater flow per capita has averaged 117 gpd, while the master plan assumed that City wastewater customers would be generating 125 gpd per person by the year 2015.[2] Thus, the impact fees are being based on the assumption of slightly lower average daily wastewater generation than the City's facility master plan, which leads to slightly lower impact fees.

Table 27
WASTEWATER FLOW PER SERVICE UNIT

Year	Daily Flow (mgd) Average	Max. Mo.	Ratio	Population	SFEs	Average gpd/SFE
1990	23.2	25.7	1.11	191,972	86,474	268
1991	22.7	23.9	1.05	195,333	87,988	258
1992	22.7	24.6	1.08	198,694	89,502	254
1993	27.6	36.0	1.30	202,055	91,016	303
1994	22.8	24.0	1.05	205,416	92,530	246
1995	25.7	32.4	1.26	208,777	94,044	273
1996	24.2	26.5	1.10	212,138	95,558	253
1997	23.9	27.3	1.14	215,499	97,072	246
1998	27.5	31.7	1.15	218,860	98,586	279
1999	24.4	28.1	1.15	222,221	100,100	244
2000	22.7	23.9	1.05	225,581	101,654	223
Average Daily Flow (gpd) per SFE						259

Source: Average and maximum month daily wastewater flow from Lincoln Public Works Department, October 11, 2001 memorandum; 1990 and 2000 population of City of Lincoln from U.S. Census Bureau; year 2000 SFEs from Table 12; SFEs for other years based on ratio of 2.22 persons per SFE from year 2000.

Cost per Service Unit

The capital cost to provide wastewater service consists primarily of treatment plant costs and major trunk sewers. Both of these components are addressed below.

Treatment Plants

The capacity of a wastewater treatment plant is a relative concept. The rated capacity of a treatment plant is generally accepted as being the capacity of the limiting process in the plant. The main types of capacity are hydraulic capacity and treatment capacity. Hydraulic capacity is the ability of the major components to physically accommodate the flow of wastewater. The treatment capacity of a secondary wastewater treatment facility consists of both clarification capacity and oxidation capacity. Clarification is the process of removing solids from the wastewater stream. Oxidation is the process of reducing the organic load carried by the wastewater to a level that meets permit effluent limits. In both plants, the limitation is the oxidative capacity, which reflects the biological capacity of the trickling filters and aeration basins. The Theresa Street plant is currently rated for a design oxidative

[2] Brown and Caldwell and HWS Consulting Group, *Lincoln Wastewater Facility Plan*, January 1995

capacity of 28 mgd, and the Northeast plant is currently rated for a design oxidative capacity of 8 mgd, at maximum month loading conditions.

The population of Lincoln has increased by over 25 percent since the last expansion of the Theresa Street plant in 1973. The City's wastewater master plan recommends improvements to upgrade and expand the capacity of both plants over the 1995-2015 period, at a cost (in 1995 dollars) of about $38 million.

The sites of the two treatment plants have adequate area for expansion to serve the needs of the City for up to 50 years. Both plants can be expanded in logical increments of capacity to meet growth needs at a cost of about $3 per gallon of required treatment capacity, according to the City's consulting wastewater engineer. If future growth of the city dictates the need for an additional treatment facility, the approximate unit cost for construction is $4 per gallon of capacity , not including the costs of land acquisition. Using the lower estimate, the cost of expanding treatment capacity needed for a new single-family customer or equivalent is $777, as shown in Table 28.

Table 28
WASTEWATER PLANT COST PER SERVICE UNIT

Treatment Plant Expansion Cost per gpd	$3.00
Average Daily Flow (gpd) per SFE	259
Treatment Plant Cost per SFE	$777

Source: Treatment plant expansion cost from Drury Whitlock, P.E., of Brown and Caldwell, January 4, 2002 memorandum; average daily flow per SFE from Table 27.

Wastewater Trunk Lines

The City is increasing the wastewater interceptor system by about 15 to 20 miles per year. A major improvement to the collection system currently underway is the Salt Creek relief sewer trunk. This project, which will ultimately cost about $24 million, is about one-third done, and will take another 8 to 10 years to complete. It is intended to serve additional growth in the City's future service areas to the south and/or southwest.

Wastewater lines within a development are installed at the developer's expense. Currently, when line extensions are needed to serve new development, or when larger lines are needed within a development in order to serve other developments, the City will pay for the cost of oversizing pipes beyond eight inches in diameter. Once the impact fees are in place, a developer will receive credit against the impact fees for the cost of any extensions of lines greater than eight inches.

One way to estimate the cost of new sewer trunk lines required to serve new development, known as the "incremental expansion" approach, is to divide the current cost of existing trunk lines by existing service units. The presumption is that the expansion of the trunk line system will be proportional to the increase in customer demand. In general, this approach is conservative compared to the improvements-driven approach, which would divide the cost of planned improvements over a fixed time period by the growth anticipated during the planning period.

The current replacement value of the existing wastewater trunk lines larger than eight inches in diameter is estimated in Table 29 below. The costs per foot shown below are somewhat higher than those used in the September 2000 *Capital Cost Memorandum*, because unlike those earlier estimates, these cost include all project costs, including engineering, inspection and easement/ROW acquisition.

Table 29
WASTEWATER TRUNK LINE COST

Pipe Diameter	Length (feet)	Cost/ Foot	Current Value
90"	130	$850	$111,000
78"	9,813	$700	$6,869,000
72"	140	$600	$84,000
60"	12,306	$450	$5,538,000
54"	16,797	$380	$6,383,000
51"	590	$350	$207,000
48"	54,248	$300	$16,274,000
42"	31,689	$275	$8,714,000
36"	56,600	$230	$13,018,000
30"	43,347	$190	$8,236,000
27"	26,366	$160	$4,219,000
24"	49,782	$130	$6,472,000
21"	48,297	$100	$4,830,000
18"	83,061	$80	$6,645,000
15"	137,379	$65	$8,930,000
12"	205,210	$50	$10,261,000
10"	151,159	$35	$5,291,000
Total	926,914		$112,082,000

Source: Pipe size, length and cost per foot from Lincoln Wastewater Superintendent, September 25, 2001 memorandum and March 1, 2002 email.

The cost of major sewer trunk lines to accommodate new development on the fringe is estimated to be $1,103 per single-family equivalent customer, as shown in Table 30.

Table 30
WASTEWATER LINE COST PER SERVICE UNIT

Wastewater Trunk Line Cost	$112,082,000
Existing Wastewater Service Units (SFEs)	101,654
Wastewater Line Cost per SFE	$1,103

Source: Wastewater trunk line cost of existing system from Table 29; existing SFEs from Table 12.

Cost per Service Unit Summary

In summary, the capital cost to serve new development is approximately $1,880 per service unit, as shown in Table 31. This represents the cost to construct the capital facilities to accommodate an additional single-family unit.

Table 31
WASTEWATER TOTAL COST PER SERVICE UNIT

Treatment Plant Cost per SFE	$777
Sewer Trunk Line Cost per SFE	$1,103
Total Wastewater Cost per SFE	$1,880

Source: Treatment plant cost from Table 28; sewer trunk line cost from Table 30.

Net Cost per Service Unit

The analysis above has estimated the actual capital cost required to accommodate an additional service unit or single-family detached dwelling at the existing level of service provided to current wastewater customers. However, new wastewater customers will be paying for some of the cost through the portion of their rates that will be used to retire existing debt on the wastewater system. Dividing the amount of outstanding debt on the wastewater system by current wastewater customers provides a reasonable estimate of the amount that new customers will be paying. In effect, this approach puts new customers on an equal footing with current customers, allowing them to pay for the same share of their capital costs through rates. As shown in Table 32, the debt service credit amounts to $65 per single-family dwelling or equivalent customer.

Table 32
WASTEWATER DEBT CREDIT PER SERVICE UNIT

Outstanding Wastewater System Debt	$6,585,066
Existing Service Units (SFEs)	101,654
Debt Service Credit per SFE	$65

Source: Outstanding wastewater system debt principal on Nebraska Department of Environmental Quality loan from City of Lincoln Finance Department, December 28, 2001 memorandum; existing SFEs from Table 12.

Reducing the cost per service unit or single-family unit by the amount of the debt service credit calculated above results in the estimated net cost per service unit or single-family dwelling. As shown in Table 33, the net cost to accommodate growth in customers is estimated to be $1,815 per new single-family customer. Currently, this cost is paid for by all customers out of wastewater rates. An alternative would be to recover this cost, or a portion of it, through a wastewater fee collected at the time of connection to the wastewater system.

Table 33
WASTEWATER NET COST PER SERVICE UNIT

Wastewater System Capital Cost	$1,880
Wastewater Debt Service Credit	$65
Wastewater Net Capital Cost	$1,815

Source: Capital costs from Table 31; debt service credits from Table 32.

As described earlier, a wastewater service unit represents the demand of a typical single-family connection, which is a 3/4" meter. Multiplying the service units associated with each meter size by the net cost per service unit calculated above gives the net cost per water meter for meters of various sizes, as shown in Table 34. These represent the maximum wastewater impact fees that can be assessed by the City of Lincoln based on the data, assumptions and methodology presented in this report.

Table 34
WASTEWATER NET COST PER METER

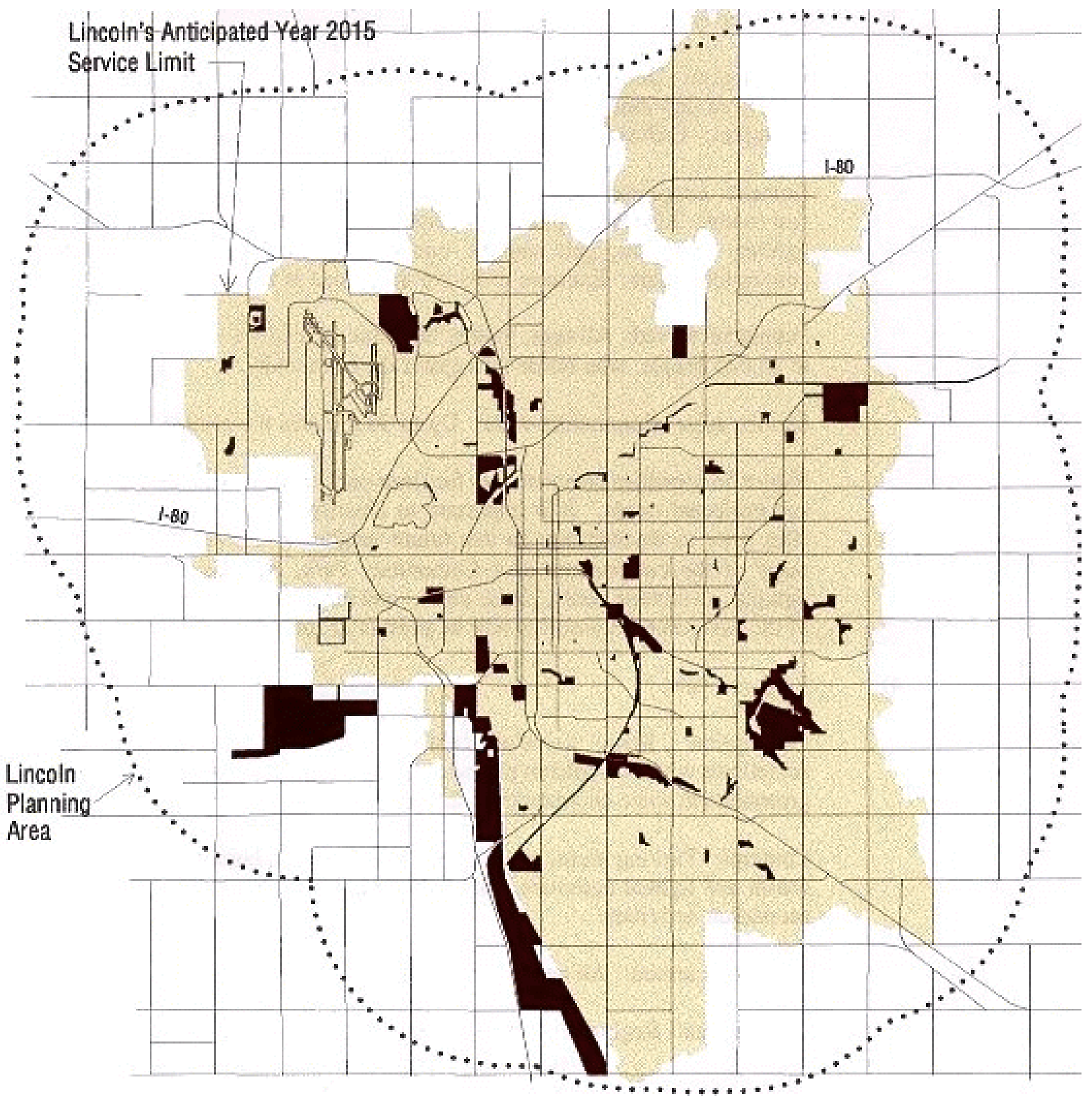
Meter Size	SFEs/ Meter	Net Cost/ SFE	Net Cost/ Meter
3/4"	1.00	$1,815	$1,815
1"	1.67	$1,815	$3,031
1-1/2"	3.33	$1,815	$6,044
2"	5.33	$1,815	$9,674
3"	10.67	$1,815	$19,366
4"	16.67	$1,815	$30,256
6"	33.33	$1,815	$60,494
8"	53.33	$1,815	$96,794
10"	76.67	$1,815	$139,156

Source: SFEs per meter from Table 12; net cost per SFE from Table 33.

NEIGHBORHOOD PARKS AND TRAILS

The City of Lincoln provides a wide variety of parks and recreational facilities. The four types of parks are mini-parks, neighborhood, community and regional parks. The City also operates many special purpose facilities, such as Pinewood Bowl, Pioneers Park Nature Center and Hyde Observatory. In addition, the City provides more than 75 miles of hiking and commuter/recreation trails, eleven swimming pools, five golf courses and eight recreation centers. The City also operates the County-owned 1,455-acre Wilderness Park, as well as the 40-acre Seacrest Range conservancy. Lancaster County is not active in the parks arena, and the City manages the one County park (Wilderness Park). The City participates in joint use of recreational facilities with the Lincoln Public School District.

Figure 9
EXISTING PARKS



The impact fees and land dedication requirements calculated in this section will cover only the cost of neighborhood parks and trails. The City's desired level of service for parks includes one 6- to 10-acre neighborhood park per square mile of residential development and a trail within one mile.

Service Area

As with the other facilities, the potential impact fees for neighborhood parks and trails will be calculated at the jurisdiction level, based on the existing average city-wide level of service. The service area where park impact fees will be collected, however, will exclude the core developed area of the city, where existing parks are generally adequate and relatively little additional development is anticipated.

In order to ensure that the fees are spent in a way that provides reasonable benefit to the fee-paying development, the service area will be subdivided into seven benefit areas. Neighborhood parks and trail impact fees collected within a designated benefit area will be earmarked and spent within that same benefit area. The service area and the seven proposed benefit areas for neighborhood parks and trails impact fees are shown in Figure 10.

Service Unit

In impact fee and fiscal impact analysis, park and recreation facilities are generally considered to benefit only residential development. It is considerably more difficult to establish the nexus between new nonresidential development and the increased demand for park facilities.

Permanent, year-round population is the most commonly-used service unit for park impact fees, parkland dedication requirements and park fiscal impact analysis. However, a more accurate and quantifiable measure is park equivalent dwelling units (EDUs). Park EDUs are the number of single-family equivalents of various housing types, based on ratios of average household size.

The first step in computing park EDUs is to determine the average household size associated with different housing types. The average household sizes for Lincoln from the 1990 Census range from about 1.6 to 2.8 persons per unit, according to the data presented in Table 35. Detailed data on household size by housing type is not yet available from the 2000 Census, but summary data reveals that the overall average household size for all housing types remained remarkably stable over the decade, declining only slightly from 2.40 in 1990 to 2.36 in 2000.

Figure 10
NEIGHBORHOOD PARKS AND TRAILS BENEFIT AREAS

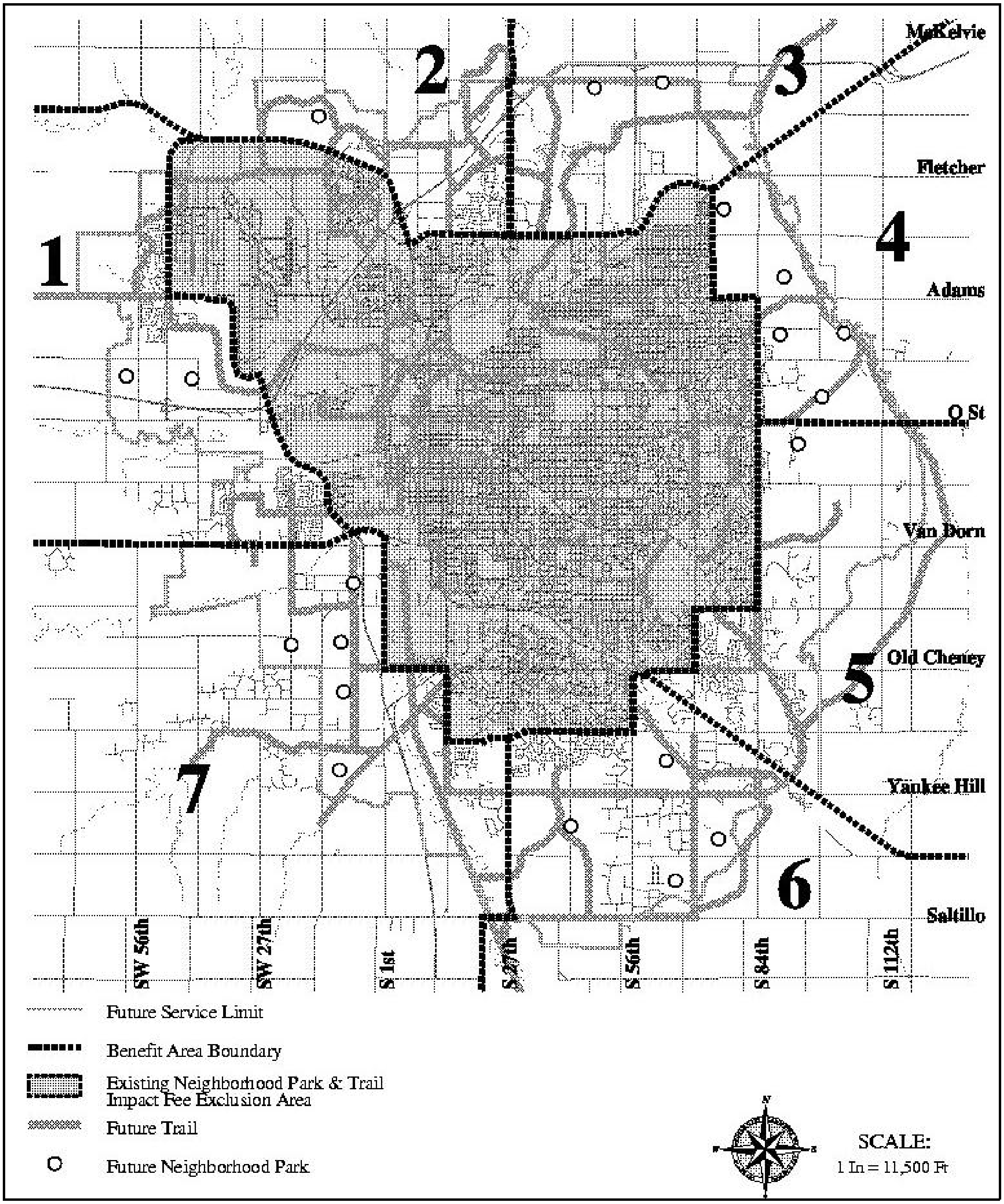


Table 35
AVERAGE HOUSEHOLD SIZE BY HOUSING TYPE, 1990

Housing Type	Total Units	Occupied Units	Household Population	Average Household Size
Single-Family Detached	46,194	44,987	125,298	2.79
Single-Family Attached	3,799	3,622	8,451	2.33
Duplex	4,572	4,265	8,831	2.07
Multi-Family	22,143	20,296	33,333	1.64
Mobile Home	2,371	2,232	5,294	2.37
Total	79,079	75,402	181,207	2.40

Source: U.S. Census Bureau, 1990 Census Summary Tape File 1 (100% count for basic demographic variables), for City of Lincoln from web site (http://venus.census.gov/cdrom/lookup); "other" included in multi-family category.

Taking the ratio of the average household size for each housing type to the average household size of a single-family unit results in the number of equivalent dwelling units associated with a dwelling unit of each housing type. Multiplying the EDUs per dwelling unit by the total number of units in Lincoln yields the total number of park service units in the city today.

Table 36
EXISTING PARK SERVICE UNITS

Housing Type	Avg, HH Size	EDUs/ Unit	Total Units	Total EDUs
Single-Family Detached	2.79	1.00	56,652	56,652
Single-Family Attached	2.33	0.84	4,659	3,914
Duplex	2.07	0.74	5,607	4,149
Multi-Family	1.64	0.59	27,156	16,022
Mobile Home	2.37	0.85	2,908	2,472
Total			96,982	83,209

Source: Average household sizes from Table 35; EDUs per unit is ratio of average house to single-family detached average household size; 2001 housing units based on total units from 2000 census inflated by 1.87 percent annual growth in housing units from 1990 to 2000 and distributed among housing types based on 1990 distribution.

Levels of Service

For the purposes of impact fee analysis, the existing level of service should be used in calculating the fees rather than a higher, desired level of service. The City's current inventory of neighborhood parks totals 496 acres and the City has developed approximately 39 miles of commuter/recreation trails, as summarized in Tables 37 and 38.

Table 37
EXISTING NEIGHBORHOOD PARKS

Park	Acres	Park	Acres	Park	Acres
40th and Hwy 2 Park	19.58	Highlands Park S	33.00	Rudge Park	6.00
American Legion Park	1.10	Jaycee Kahoa Park	6.10	Seacrest Park	45.75
Arnold Heights Park	17.63	Keech Park	11.26	Standing Bear Park	20.86
Bishop Heights Park	7.02	Lakeview Park	2.59	Stuhr Park	2.23
Coddington & A Park	9.66	Larson Park	12.55	Sunburst Park	0.70
Colonial Hills Park	18.07	Lintel Park	2.10	Sunrise/Norwood Park	1.91
Cripple Creek Park	6.33	Marlene Park	0.25	Taylor Park	19.27
Easterday Park	5.26	Neighbors Park	4.30	Trendwood Park	19.67
ECCO Park	1.22	Olympic Heights Park	15.80	Tyrrell Park	12.51
Eden Park	10.12	Pansing Park	9.30	UPCO Park	6.00
Edenton South Park	3.00	Pentzer Park	4.05	Van Dorn Park	28.00
Filbert Park	4.66	Phares Park	6.50	Vavrina Park	0.30
Havelock Park	3.60	Piedmont Park	9.25	West Lincoln Park	3.76
Hayward Park	18.35	Pinelake Rd Park	19.12	Willard/Schroder Park	2.00
Henry Park	7.01	Porter Park	12.00	Williamsburg Park	10.56
Herbert Park	7.68	Roberts Park South	15.49	Woodside Park	1.32
Highlands Park	10.86	Roose Park	0.30		
Total Acres					495.95

Source: Lincoln Parks Department, February 14, 2002 memorandum.

Table 38
EXISTING TRAILS

Trail	Miles
Billy Wolfe	4.4
Bison	1.6
John Dietrich	3.3
Mopac	3.6
Murdock	4.3
Rock Island	4.7
Highway 2	3.1
Old Cheney	3.0
Williamsburg/Tierra	2.3
Southridge	1.8
Superior Street	3.7
84th Street	2.8
Total Miles	38.6

Source: Lincoln Parks Department, December 10, 2001 memorandum.

The existing levels of service for neighborhood parks and trails are summarized in the following table.

Table 39
NEIGHBORHOOD PARKS AND TRAILS LEVELS OF SERVICE

Facility	Acres or Miles	EDUs	Acres/Miles per EDU
Neighborhood Park Land (acres)	495.95	83,209	0.00596
Trails (miles)	38.60	83,209	0.00046

Source: Neighborhood park acres from Table 37; miles of trail from Table 38; EDUs from Table 36.

The City does not have a mandatory park land dedication requirement, although it does encourage developers to donate land. Park land dedication requirements are one of the oldest and most common forms of developer exactions, and are generally coupled with a provision that allows the City to accept cash in-lieu of dedication. Today they often play a supplementary role in a park impact fee system, in which the City can require land dedication if there is a suitable park site with a proposed subdivision, and the developer is given credit for the value of any such required dedication against the park impact fees.

Most park land dedication requirements are based on the level of service for neighborhood parks, but not for regional parks or conservancy land. This is because a residential development, no matter how large, is unlikely to be required to dedicate a regional park or conservancy site. Potential park land dedication requirements, based on the existing level of service for neighborhood parks and park service units by housing type, are presented in Table 40.

Table 40
PARK LAND DEDICATION REQUIREMENTS

Housing Type	EDUs/ Unit	Acres/ EDU	Acres/ Unit
Single-Family Detached	1.00	0.00596	0.00596
Single-Family Attached	0.84	0.00596	0.00501
Duplex	0.74	0.00596	0.00441
Multi-Family	0.59	0.00596	0.00352
Mobile Home Park (per pad site)	0.85	0.00596	0.00507

Source: EDUs per unit from Table 36; acres/EDU from Table 39.

Cost per Service Unit

Over the last four years, the City has developed two new neighborhood parks: Edenton South and Porter Park. Based on this experience, the estimated current cost for developing a typical eight-acre neighborhood park, including site grading and drainage improvements, seeding, construction of a playground, construction of a park shelter and site landscaping, is about $16,000 per acre, as detailed in Table 41.

Table 41
NEIGHBORHOOD PARK DEVELOPMENT COST PER ACRE

Description	Units	Quantity	Unit Cost	Cost
Site Grading and Drainage	l.s.	1	$9,000	$9,000
Landscaping: Seeds	lbs.	2,120	$1.50	$3,180
Landscaping: Trees	ea.	80	$250	$20,000
Sidewalks	sq. ft.	1,200	$2.50	$3,000
Play Court	sq. ft.	1,200	$2.50	$3,000
Basketball Goal and Pole	ea.	1	$760	$760
Pre-fab Picnic Shelter Structure	ea.	1	$9,000	$9,000
Picnic Shelter Pad	sq. ft.	784	$2.50	$1,960
Picnic Tables	ea.	4	$450	$1,800
Trash Receptacles	ea.	2	$250	$500
Modular Play Structure	ea.	1	$16,000	$16,000
Play Area Benches	ea.	2	$500	$1,000
Rubber Tile Play Area Matting	l.s.	1	$20,000	$20,000
Sand for Non-Tiled Play Surface	tons	300	$9.50	$2,850
Construction Labor	l.s.	1	$20,500	$20,500
Subtotal				$112,550
Engineering/Design Services				$15,194
Total Cost				$127,744
Park Size (acres)				8.0
Development Cost per Acre				$15,968

Source: Lincoln Parks and Recreation Department, Planning and Construction Manager, December 27, 2001 memorandum.

While recent land for neighborhood parks has been acquired through dedication at annexation, it is estimated that land in developing areas would cost about $30,000 per acre to purchase for park sites. Based on these parameters, the total land and improvement cost for a new neighborhood park will run approximately $46,000 per acre, as shown in Table 42.

Table 42
PARK COST PER ACRE

Development Cost per Acre	$15,968
Land Cost per Acre	$30,000
Total Cost per Acre	$45,968

Source: Development cost from Table 41; land cost from Lincoln Parks and Recreation Department, July 20, 2000 memorandum.

Over the last two years, the City has designed three trail projects and has completed construction of two of them. All three are concrete trails. The average cost of these projects for construction and engineering/design is about $282,000 per mile, as shown in Table 43.

Table 43
TRAIL DEVELOPMENT COST PER ACRE

Facility	Cost	Miles	Cost/Mile
Bison Trail (10' wide)	$386,401	1.7	$227,295
Tierra Williamsburg Trail (10' wide)	$289,792	1.1	$263,447
Husker Link Trail (12' wide)	$395,000	1.0	$395,000
Total	$1,071,193	3.8	$281,893

Source: Planning and Construction Manager, Lincoln Parks and Recreation Department, December 27, 2001 memorandum.

The cost to provide a new single-family unit or equivalent with neighborhood parks and trails at the City's existing level of service is $404, as shown in Table 44.

Table 44
NEIGHBORHOOD PARKS AND TRAILS COST PER SERVICE UNIT

Component	Acres/Miles per EDU	Cost per Acre/Mile	Cost per EDU
Neighborhood Park Land (acres)	0.00596	$45,968	$274
Trail Development (miles)	0.00046	$281,893	$130
Total			$404

Source: Acres/miles per EDU from Table 39; park land and development costs per acre from Table 42; trail development cost per mile from Table 43.

Net Cost per Service Unit

Some of the cost to provide new residents with park facilities will be paid by the new residents themselves through future property tax payments that will be used to retire outstanding debt on existing park facilities. In addition, some of the park capital costs to serve growth will be paid by outside funding sources. Consequently, the cost per service unit should be reduced to take account of these factors, and the result is referred to as the net capital cost.

There are several outstanding bond issues that were used exclusively or partially to fund park improvements.[3] However, none of this debt was used for neighborhood parks or trails. There is one trail that is to be funded with the 1999 GO bonds, but this project has not been completed and the trail is not counted in the existing inventory. Consequently, no credit for outstanding debt is warranted against neighborhood park and trail impact fees.

The major source of outside funding for parks is Keno funds. In the current six-year *Capital Improvement Program*, the City anticipates spending $31,667 annually in Keno funds on growth-related improvements to neighborhood parks (funds spent on rehabilitation of existing neighborhood parks are not included), as summarized in Table 45.

Table 45
KENO FUNDING FOR NEW NEIGHBORHOOD PARKS, 2002-2007

Country View Neighborhood Park	$10,000
Neighborhood Park	$70,000
North Lincoln Neighborhood Park	$20,000
Phares Park Construction	$55,000
South Lincoln Neighborhood Park	$20,000
Belmont Park Play Court	$5,000
Vintage Heights Mini Park	$10,000
Total Keno Funding for New Neighborhood Parks	$190,000
Years in Capital Improvements Program	6
Annual Keno Funding for New Neighborhood Parks	$31,667

Source: City of Lincoln, *Capital Improvements Program, FY 2002-2007*.

Besides Keno funds, the other major source of outside funding for parks and trails is state and federal grants. In particular, there has been a considerable amount of federal transportation funding available for trail projects in recent years. Other grants have not been used for neighborhood parks or trails. While it is difficult to project the future availability of grant funding, the recent past is the best available guide to future funding. Over the past five years, the City has received an average of $84,200 annually in grants for neighborhood parks and trails, as shown in Table 46.

[3] In 2000, the City issued $3.2 million in Municipal Infrastructure Redevelopment Fund Bonds to build a community recreation center. In 1999, the City issued $21.8 million in general obligation (GO) bonds to fund two parks and two libraries. Also in 1999, the City issued $8.22 million in GO bonds to refund 1989 and 1991 GO bonds, and the 1989 bonds were partially used to fund the trail system, park property and zoo facilities.

Table 46
PARK GRANTS, FY 1996-2000

Grant	Year	Amount	NH Parks & Trails Total	NH Parks & Trails Annual
NE Environmental Trust (dredge ponds)	1995-96	$103,000	$0	$0
LPSNRD Community Forestry Program	1995-96	$23,000	$0	$0
LPSNRD Community Forestry Program	1995-96	$11,200	$0	$0
Nebraska Recycling Fund (playgrounds)	1997-98	$11,000	$11,000	$2,200
TEA-21 (Bison Trail)	1997-98	$322,000	$322,000	$64,400
Nebraska Recreational Trails Program (Bison Trail)	1997-98	$20,000	$20,000	$4,000
LPSNRD Community Forestry Program	1997-98	$5,400	$0	$0
FEMA Grant (tree replacement)	1998-99	$249,000	$0	$0
Nebraska Recreational Trails Program (Wmburg/Tierra Trail)	1998-99	$68,000	$68,000	$13,600
LPSNRD Community Forestry Program	1998-99	$3,000	$0	$0
Institute of Museums & Libraries (Pioneers Park Nature Ctr)	1999-00	$66,000	$0	$0
Pipher, Jaffrey Foundation (Green Team)	1999-00	$10,000	$0	$0
Nebraska Recycling Fund (playgrounds)	1999-00	$10,000	$0	$0
Subtotal, Neighborhood Parks			$11,000	$2,200
Subtotal, Trails			$410,000	$82,000
Total, Neighborhood Parks and Trails			$421,000	$84,200

Source: Memorandum from Lincoln Parks and Recreation Department Director, July 20, 2000.

Credit for these outside sources of capital funding can be calculated by determining the percentage of the annual cost to maintain the existing level of service that will be funded with the anticipated annual outside funds.

Table 47
PARK OUTSIDE FUNDING CREDIT

	NH Parks	Trails	Total
Annual Housing Unit Growth	1,612	1,612	1,612
Park EDUs per Housing Unit	0.858	0.858	0.858
Annual EDU Growth	1,383	1,383	1,383
Cost/EDU	$274	$130	$404
Annual Cost to Maintain LOS	$378,942	$179,790	$558,732
Total Annual Outside Funding	$33,867	$82,000	$115,867
Percent Outside Funding	8.9%	45.6%	20.7%

Source: Annual housing unit growth is average increase in City of Lincoln from 1990 to 2000 from U.S. Census; EDUs per unit derived from Table 36; cost/EDU from Table 44; annual outside funding from Tables 45 and 46.

Deducting the portion of the cost of new growth-related neighborhood parks and trails that are anticipated to be paid with outside funding sources yields the net cost to maintain the existing level of service, which is $321 per equivalent dwelling unit.

Table 48
NEIGHBORHOOD PARKS AND TRAILS NET COST PER SERVICE UNIT

	NH Parks	Trails	Total
Capital Cost per EDU	$274	$130	$404
Outside Funding Credit Percentages	8.9%	45.6%	20.7%
Outside Funding per EDU	$24	$59	$84
Net Cost per EDU	$250	$71	$321

Source: Capital costs from Table 44; outside funding percentages from Table 47.

The net cost per dwelling unit of providing new residential developments with the existing level of neighborhood parks facilities and trails is shown in Table 49 below for various housing types.

Table 49
NEIGHBORHOOD PARKS AND TRAILS NET COST PER DWELLING UNIT

Housing Type	EDUs/ Unit	NH Parks Net Cost/Unit	Trails Net Cost/Unit	Total Net Cost/Unit
Single-Family Detached	1.00	$250	$71	$321
Single-Family Attached	0.84	$210	$60	$270
Duplex	0.74	$185	$53	$238
Multi-Family	0.59	$148	$42	$190
Mobile Home Park (per pad site)	0.85	$213	$60	$273

Source: EDUs per unit from Table 36; net cost per unit based on net cost per EDU from Table 48.

APPENDIX

Table 50
EXISTING MAJOR ROAD INVENTORY

Street Name	From	To	Lns	Miles	Capacity	Volume	VMC	VMT
Superior St	N 1st St	I-180	4	0.36	28,000	17,000	10,080	6,120
Superior St	I-180	N 14th St	4	0.68	28,000	25,350	19,040	17,238
Superior St	N 14th St	N 48th St	4	2.49	28,000	30,700	69,720	76,443
Superior St	N 48th St	Havelock Ave	4	0.46	28,000	15,200	12,880	6,992
Havelock Ave	Cornhusker Hwy	Touzalin Ave	2	0.04	12,000	15,700	480	628
Havelock Ave	Touzalin Ave	N Cotner/N 66th	2	0.50	12,000	15,700	6,000	7,850
Havelock Ave	N Cotner/N66th	N 70th St	2	0.29	12,000	12,000	3,480	3,480
Fremont St	N 48th St	N 56th St	2	0.50	10,000	7,700	5,000	3,850
Fremont St	N 56th St	Touzalin Ave	2	0.21	10,000	8,500	2,100	1,785
Fremont St	Touzalin Ave	N 66th St	2	0.53	10,000	6,600	5,300	3,498
Fremont St	N 66th St	N 70th St	2	0.29	10,000	5,700	2,900	1,653
W Adams St	Airport Terminal	NW 12th St	4	0.54	28,000	8,900	15,120	4,806
Adams St	Cornhusker Hwy	N 45th St	2	0.07	12,000	13,600	840	952
Adams St	N 45th St	N 50th St	2	0.27	12,000	13,400	3,240	3,618
Adams St	N 50th St	N 66th St	2	1.18	10,000	12,800	11,800	15,104
Adams St	N 66th St	N 70th St	2	0.29	10,000	9,000	2,900	2,610
Adams St	N 70th St	N 84th St	2	1.00	10,000	7,300	10,000	7,300
Huntington Ave	N 33rd St	N 42nd St	4	0.62	20,000	7,900	12,400	4,898
Leighton Ave	N 42th St	N 48th St	4	0.29	20,000	7,900	5,800	2,291
Leighton Ave	N 48th St	N 56th St	2	0.50	12,000	7,100	6,000	3,550
Leighton Ave	N 56th St	N Cotner Blvd	2	0.70	12,000	5,500	8,400	3,850
Holdrege St	Bridge End	Stadium Dr	2	0.01	12,000	10,300	not in service area	
Holdrege St	Stadium Dr	N 14th St	2	0.35	12,000	13,800	not in service area	
Holdrege St	N 16th St	N 17th St	2	0.12	16,000	17,300	not in service area	
Holdrege St	N 17th St	N 26th St	2	0.59	12,000	17,300	not in service area	
Holdrege St	N 26th St	N 31st St	4	0.33	24,000	18,000	not in service area	
Holdrege St	N 31st St	N 47th St	3	1.13	16,000	18,250	18,080	20,622
Holdrege St	N 47th St	N 49th St	4	0.14	24,000	15,000	3,360	2,100
Holdrege St	N 49th St	N 56th St	2	0.48	12,000	15,000	5,760	7,200
Holdrege St	N 56th St	N Cotner Blvd	2	0.72	12,000	13,000	8,640	9,360
Holdrege St	N Cotner Blvd	N 70th St	2	0.29	12,000	10,500	3,480	3,045
Holdrege St	N 70th St	N 84th St	2	1.00	10,000	5,800	10,000	5,800
Vine St	N16th St	N 30th St	4	1.05	20,000	18,200	not in service area	
Vine St	N 30th St	N 48th St	4	1.30	20,000	21,367	26,000	27,777
Vine St	N 48th St	N 66th St	4	1.22	24,000	14,700	29,280	17,934
Vine St	N 66th St	N 70th St	2	0.30	12,000	11,100	3,600	3,330
R St	N 44th St	N 50th St	4	0.23	24,000	7,200	5,520	1,656

Street Name	From	To	Lns	Miles	Capacity	Volume	VMC	VMT
R St	N 50th St	N 56th St	2	0.40	12,000	11,600	4,800	4,640
Q St	N 9th St	N 27th St	2	1.37	14,000	7,500	not in service area	
W O St	City Limt	W 56th St	4	0.16	24,000	10,200	3,840	1,632
W O St	W 56th St	W 48th St	4	0.50	24,000	10,200	12,000	5,100
W O St	W 48th St	W 44th St	4	0.25	24,000	10,200	6,000	2,550
W O St	W 44th St	W 40th St	4	0.25	24,000	10,800	6,000	2,700
W O St	W 40th St	W 27th St	4	0.98	28,000	16,000	27,440	15,680
W O St	W 27th St	Capitol Beach	4	0.88	28,000	20,800	24,640	18,304
W O St	Capitol Beach	7th St	4	1.26	28,000	22,600	35,280	28,476
O St	7th St	9th St	4	0.29	24,000	25,450	not in service area	
O St	9th St	30th St	4	1.56	24,000	29,200	not in service area	
O St	30th St	40th St	4	0.79	28,000	45,300	22,120	35,787
O St	40th St	48th St	4	0.50	28,000	41,700	14,000	20,850
O St	48th St	Cotner Blvd	4	0.63	28,000	36,400	17,640	22,932
O St	Cotner Blvd	70th St	4	0.66	28,000	38,800	18,480	25,608
O St	70th St	84th St	4	1.00	28,000	24,100	28,000	24,100
O St	84th St	City Limt	4	0.05	28,000	9,900	1,400	495
L St	S 9th St	S 21st St	3	0.93	21,000	15,500	not in service area	
K St	S 9th St	S 22nd St	3	1.00	21,000	16,400	not in service area	
Randolph St	Capitol Parkway	S 27th St	2	0.22	12,000	3,500	not in service area	
Randolph St	S 27th St	S 33rd St	2	0.50	12,000	10,700	6,000	5,350
Randolph St	S 33rd St	S 40th St	2	0.51	12,000	10,100	6,120	5,151
Randolph St	S 40th St	S 48th St	2	0.50	10,000	9,700	5,000	4,850
Randolph St	S 48th St	S Cotner Blvd	2	0.50	10,000	7,300	5,000	3,650
W A St	S Coddington	SW 10th St	2	0.74	10,000	3,500	7,400	2,590
W A St	SW 10th St	S Folsom St	2	0.32	10,000	4,800	3,200	1,536
W A St	S Folsom St	S 1st St	2	0.67	10,000	5,100	6,700	3,417
A St	S 1st St	S 10th St	2	0.72	10,000	5,500	7,200	3,960
A St	S 10th St	S 21st St	2	0.87	10,000	7,700	8,700	6,699
A St	S 21st St	Memorial Dr	2	0.60	10,000	12,100	6,000	7,260
A St	Memorial Dr	Chautauqua	2	0.18	12,000	12,100	2,160	2,178
A St	Chautauqua	S 40th St	2	0.57	12,000	14,900	6,840	8,493
A St	S 40th St	S Cotner Blvd	2	0.63	12,000	12,500	7,560	7,875
A St	S Cotner Blvd	S 56th St	2	0.38	12,000	12,000	4,560	4,560
A St	S 56th St	S 70th St	4	1.00	20,000	16,800	20,000	16,800
A St	S 70th St	S 84th St	4	1.00	20,000	15,000	20,000	15,000
South St	Park Blvd	S 8th St	2	0.22	12,000	7,300	2,640	1,606
South St	S 8th St	S 10th St	4	0.15	24,000	10,700	3,600	1,605
South St	S 10th St	S 13th St	4	0.23	20,000	14,900	4,600	3,427
South St	S 13th St	S 17th St	4	0.28	20,000	20,900	5,600	5,852
South St	S 17th St	S 27th St	4	0.75	20,000	20,600	15,000	15,450
South St	S 27th St	S 41st St	4	0.98	20,000	19,550	19,600	19,159

Street Name	From	To	Lns	Miles	Capacity	Volume	VMC	VMT
South St	S 41st St	S 48th St	2	0.43	12,000	19,000	5,160	8,170
South St	S 48th St	S 56th St	2	0.50	12,000	11,400	6,000	5,700
South St	S 56th St	S 70th St	2	1.00	12,000	10,700	12,000	10,700
Van Dorn St	City Limit	S 10th St	4	0.45	28,000	16,200	12,600	7,290
Van Dorn St	S 10th St	S 17th St	2	0.54	12,000	9,300	6,480	5,022
Van Dorn St	S 17th St	S 27th St	2	0.80	10,000	9,450	8,000	7,560
Van Dorn St	S 27th St	Sheridan Blvd.	2	0.12	10,000	9,450	1,200	1,134
Van Dorn St	S 48th St	S 56th St	4	0.57	28,000	13,200	15,960	7,524
Van Dorn St	Normal Blvd	S 70th St	2	0.39	10,000	7,900	3,900	3,081
Van Dorn St	S 70th St	S 84th St	2	1.50	12,000	7,400	18,000	11,100
Calvert St	Sheridan Blvd	S 48th St	2	0.30	10,000	7,600	3,000	2,280
Pioneers Blvd	W. City Limits	S 8th St	2	0.56	6,000	5,800	3,360	3,248
Pioneers Blvd	Teri Lane	S 40th St	2	0.90	12,000	11,300	10,800	10,170
Pioneers Blvd	S 40th St	S 48th St	2	0.41	12,000	12,000	4,920	4,920
Pioneers Blvd	S 48th St	S 56th St	2	0.50	12,000	11,000	6,000	5,500
Pioneers Blvd	S 56th St	S 70th St	4	0.99	20,000	11,400	19,800	11,286
Pioneers Blvd	S 70th St	S 84th St	2	0.99	10,000	4,600	9,900	4,554
Old Cheney Blvd	City Limit	Salt Valley View	2	0.38	12,000	7,400	4,560	2,812
Old Cheney Blvd	Salt Valley View	Tipperary Tr	4	0.89	28,000	24,000	24,920	21,360
Old Cheney Blvd	Tipperary Tr	S 25th St	4	0.35	28,000	23,000	9,800	8,050
Old Cheney Blvd	S 25th St	S 27th St	4	0.12	28,000	22,000	3,360	2,640
Old Cheney Blvd	S 27th St	S 40th St	4	1.43	28,000	22,800	40,040	32,604
Old Cheney Blvd	S 40th St	S 48th St	4	0.77	28,000	26,800	21,560	20,636
Old Cheney Blvd	S 48th St	S 58th St	4	0.61	28,000	23,300	17,080	14,213
Old Cheney Blvd	S 58th St	Nebraska Hwy	4	0.10	28,000	10,500	2,800	1,050
Old Cheney Blvd	Nebraska Hwy	S 70th St	2	0.82	10,000	15,100	8,200	12,382
Old Cheney Blvd	S 70th St	S 77th St	2	0.47	10,000	8,600	4,700	4,042
Old Cheney Blvd	S 77th St	S 84th St	2	0.54	10,000	7,000	5,400	3,780
Pine Lake Rd	S 14th St	S 27th St	4	1.01	28,000	9,500	28,280	9,595
Pine Lake Rd	S 27th St	S 32nd St	4	0.49	28,000	12,600	13,720	6,174
Pine Lake Rd	S 32nd St	S 34th St	4	0.12	28,000	12,600	3,360	1,512
Pine Lake Rd	S 34th St	S 40th St	4	0.43	28,000	12,600	12,040	5,418
Pine Lake Rd	S 40th St	S 42nd St	4	0.26	28,000	9,500	7,280	2,470
Pine Lake Rd	S 42nd St	S 45th St	2	0.14	10,000	9,500	1,400	1,330
Pine Lake Rd	S 45th St	S 56th St	2	0.74	10,000	9,500	7,400	7,030
Pine Lake Rd	S 56th St	S 70th St	2	1.00	10,000	3,700	10,000	3,700
Pine Lake Rd	S 70th St	Nebraska Hwy	2	0.06	10,000	3,800	600	228
Pine Lake Rd	S 91st St	S 98th St	2	0.49	6,000	2,000	2,940	4,900
NW 48th St	W Fletcher Ave	Air Park Rd	2	1.12	10,000	4,200	11,200	4,704
NW 48th St	Air Park Rd	W Thatcher Ln	2	1.39	10,000	7,900	13,900	10,981
NW 12th St	Isaac Dr	W Highland	2	0.30	12,000	12,700	3,600	3,810
NW 12th St	W Highland	Kingbird Rd	4	0.20	12,000	12,700	2,400	2,540

Street Name	From	To	Lns	Miles	Capacity	Volume	VMC	VMT
NW 12th St	Kingbird Rd	W Adams St	4	0.67	12,000	12,700	8,040	8,509
N 1st St	Benton St	Adams St	2	0.50	10,000	9,500	5,000	4,750
N 1st St	Adams St	W Dawes Ave	2	0.38	10,000	10,000	3,800	3,800
N 1st St	W Dawes Ave	Cornhusker Hwy	2	0.13	14,000	5,400	1,820	702
N 9th St	U St	L St	4	0.62	28,000	24,700	not in service area	
9th St	L St	G St	3	0.30	21,000	17,400	not in service area	
9th St	G St	South St	3	0.98	24,000	16,300	23,520	15,974
9th St	South St	Van Dorn St.	2	0.50	16,000	14,200	8,000	7,100
N 10th St	Sun Valley Blvd	Charleston St	2	0.59	12,000	11,800	not in service area	
N 10th St	Charleston St	Bridge End	2	0.56	10,000	13,800	not in service area	
N 10th St	Avery Ave	U St	2	0.08	10,000	12,100	not in service area	
N 10th St	Bridge End	T St	2	0.12	10,000	12,100	not in service area	
N 10th St	T St	R St	4	0.40	28,000	12,100	not in service area	
10th St	R St	G St	3	0.76	21,000	19,350	not in service area	
10th St	G St	South St	3	0.95	21,000	16,600	19,950	15,770
10th St	South St	Van Dorn St	3	0.56	21,000	14,200	11,760	7,952
S 13th St	M St	K St	3	0.15	21,000	13,750	not in service area	
S 13th St	K St	G St	4	0.22	20,000	13,750	not in service area	
S 13th St	G St	Hudson St	4	1.03	20,000	13,700	20,600	14,111
S 13th St	Hudson St	Van Dorn St	2	0.44	12,000	13,600	5,280	5,984
S 13th St	Van Dorn St	Arapahoe St	2	0.36	10,000	13,300	3,600	4,788
S 13th St	Arapahoe St	Burnham St	4	0.41	16,000	13,300	6,560	5,453
N 14th St	Fletcher Ave	Superior St	2	0.84	10,000	2,900	8,400	2,436
N 14th St	Superior St	Atlas Ave	2	0.34	12,000	7,900	4,080	2,686
N 14th St	Atlas Ave	Adams St	2	0.69	12,000	9,000	8,280	6,210
N 14th St	Adams St	Salt Crk Bridge	2	0.65	12,000	10,500	7,800	6,825
N 14th St	Salt Crk Bridge	Court St	4	0.37	20,000	12,800	not in service area	
N 14th St	Court St	W St	2	0.41	12,000	11,000	not in service area	
S 14th St	Nebraska Hwy	Old Cheney Rd	4	1.16	28,000	23,300	32,480	27,028
S 14th St	Old Cheney Rd	Pine Lake Rd.	2	1.18	10,000	10,400	11,800	12,272
N 16th St	Holdrege St	Vine St	3	0.41	21,000	11,200	not in service area	
N 16th St	Vine St	O St	3	0.49	21,000	19,400	not in service area	
S 16th St	O St	G St	3	0.53	21,000	19,400	not in service area	
S 16th St	G St	A St	2	0.46	14,000	9,600	6,440	4,416
S 16th St	A St	South St	2	0.51	14,000	9,000	7,140	4,590
N 17th St	Holdrege St	Vine St	3	0.51	21,000	11,050	not in service area	
N 17th St	Vine St	O St	3	0.50	21,000	19,700	not in service area	
S 17th St	O St	G St	3	0.54	21,000	19,700	not in service area	
S 17th St	G St	A St	3	0.46	21,000	10,500	9,660	4,830
S 17th St	A St	South St	3	0.57	21,000	10,000	11,970	5,700
S 17th St	South St	Van Dorn St	2	0.50	10,000	5,200	5,000	2,600
S 21st St	O St	L St	2	0.31	28,000	6,500	not in service area	

Street Name	From	To	Lns	Miles	Capacity	Volume	VMC	VMT
N 27th St	City Limit	Fletcher Ave	4	0.54	28,000	11,000	15,120	5,940
N 27th St	Fletcher Ave	Kensington Dr	4	0.40	28,000	14,500	11,200	5,800
N 27th St	Kensington Dr	Superior St	4	0.39	28,000	22,500	10,920	8,775
N 27th St	Superior St	Fairfield St	4	0.65	28,000	28,900	18,200	18,785
N 27th St	Fairfield St	Railroad Tracks	4	0.92	30,000	30,300	27,600	27,876
N 27th St	Railroad Tracks	Vine St	4	0.93	30,000	31,800	not in service area	
N 27th St	Vine St	O St	4	0.53	28,000	31,600	not in service area	
S 27th St	O St	Randolph St	4	0.50	28,000	25,000	not in service area	
S 27th St	Randolph St.	Capitol Parkway	4	0.22	28,000	23,700	not in service area	
S 27th St	Capitol Parkway	A St	4	0.24	28,000	22,400	6,720	5,376
S 27th St	A St	Ryons St	4	0.57	16,000	21,900	9,120	12,483
S 27th St	Ryons St	Sheridan Blvd	2	0.25	12,000	19,000	3,000	4,750
S 27th St	Sheridan Blvd	Calvert St	2	0.61	12,000	20,600	7,320	12,566
S 27th St	Calvert St	Nebraska Hwy	2	0.54	12,000	20,500	6,480	11,070
S 27th St	Nebraska Hwy	Tierra Dr	4	0.29	28,000	17,250	8,120	5,003
S 27th St	Tierra Dr	Old Cheney Rd	4	0.63	28,000	14,000	17,640	8,820
S 27th St	Old Cheney Rd	Coronado Dr	4	0.53	28,000	11,500	14,840	6,095
S 27th St	Coronado Dr	Lardeo Dr	4	0.19	24,000	6,700	4,560	1,273
S 27th St	Lardeo Dr	Pine Lake Rd	4	0.37	28,000	6,700	10,360	2,479
N 33rd St	Cornhusker Hwy	Huntington Ave	2	0.04	12,000	12,300	480	492
N 33rd St	Huntington Ave	Holdrege St	2	0.57	12,000	14,700	6,840	8,379
N 33rd St	Holdrege St	X St	2	0.36	12,000	15,000	4,320	5,400
N 33rd St	X St	U St	2	0.18	12,000	13,000	2,160	2,340
N 33rd St	U St	O St	2	0.48	12,000	12,000	5,760	5,760
S 33rd St	O St	Randolph St	2	0.54	12,000	9,700	6,480	5,238
S 33rd St	Randolph St	Normal Blvd	2	0.59	12,000	7,450	7,080	4,396
S 33rd St	South St	Van Dorn St	2	0.50	12,000	5,000	6,000	2,500
S 33rd St	Van Dorn St	Sheridan Blvd	2	0.29	12,000	6,500	3,480	1,885
S 33rd St	Sheridan Blvd	Nebraska Hwy	2	0.79	12,000	9,100	9,480	7,189
S 40th St	O St	Randolph St	2	0.49	6,000	6,300	2,940	3,087
S 40th St	Randolph St	A St	2	0.50	12,000	9,200	6,000	4,600
S 40th St	A St	Normal Blvd	2	0.57	12,000	11,050	6,840	6,299
S 40th St	Normal Blvd	Van Dorn St	2	0.31	12,000	14,600	3,720	4,526
S 40th St	Van Dorn St	Sheridan Blvd	2	0.40	12,000	15,500	4,800	6,200
S 40th St	Sheridan Blvd	Pioneers Blvd	2	0.48	12,000	14,050	5,760	6,744
S 40th St	Pioneers Blvd	Gertie Ave	2	0.38	12,000	12,300	4,560	4,674
S 40th St	Gertie Ave	Old Cheney Rd	4	0.63	28,000	14,000	17,640	8,820
S 40th St	Old Cheney Rd	Faulkner Dr	4	0.37	28,000	15,600	10,360	5,772
S 40th St	Faulkner Dr	Pine Lake Rd	4	0.70	28,000	9,200	19,600	6,440
N 48th St	Superior St	Cornhusker Hwy	2	0.37	10,000	10,100	3,700	3,737
N 48th St	Cornhusker Hwy	Greenwood St	4	0.59	16,000	20,200	9,440	11,918
N 48th St	Greenwood St	Leighton Ave	4	0.57	20,000	26,000	11,400	14,820

Street Name	From	To	Lns	Miles	Capacity	Volume	VMC	VMT
N 48th St	Leighton Ave	Holdrege St	4	0.37	28,000	29,200	10,360	10,804
N 48th St	Holdrege St	Vine St	4	0.50	28,000	30,000	14,000	15,000
N 48th St	Vine St	R St	4	0.25	28,000	29,000	7,000	7,250
N 48th St	R St	O St	4	0.25	28,000	27,800	7,000	6,950
S 48th St	O St	M St	4	0.13	28,000	17,500	3,640	2,275
S 48th St	M St	Randolph St	2	0.38	12,000	17,500	4,560	6,650
S 48th St	Randolph St	A St	2	0.50	12,000	16,000	6,000	8,000
S 48th St	A St	Newton St	2	0.59	12,000	16,150	7,080	9,529
S 48th St	Newton St	Normal Blvd	2	0.15	12,000	16,000	1,800	2,400
S 48th St	Normal Blvd	Van Dorn St	4	0.26	28,000	26,000	7,280	6,760
S 48th St	Van Dorn St	Calvert St	2	0.51	12,000	20,000	6,120	10,200
S 48th St	Calvert St	Pioneers Blvd	2	0.50	10,000	16,600	5,000	8,300
S 48th St	Pioneers Blvd	Nebraska Hwy	2	0.55	12,000	11,500	6,600	6,325
S 48th St	Nebraska Hwy	Old Cheney Rd	4	0.25	28,000	16,100	7,000	4,025
Link 55X/56th St	Arbor Rd	Fletcher Ave	4	1.29	28,000	9,900	36,120	12,771
Link 55X/56th St	Fletcher Ave	Russell Dr	4	0.98	28,000	10,400	27,440	10,192
N 56th St	Russell Dr	Cornhusker Hwy	4	0.22	28,000	10,400	6,160	2,288
N 56th St	Adams St	Leighton Ave	2	0.50	12,000	13,500	6,000	6,750
N 56th St	Leighton Ave	Holdrege St	2	0.53	12,000	14,900	6,360	7,897
N 56th St	Holdrege St	Vine St	2	0.50	12,000	19,500	6,000	9,750
N 56th St	Vine St	O St	2	0.45	12,000	14,150	5,400	6,368
S 56th St	O St	S Cotner Blvd	2	0.51	12,000	13,400	6,120	6,834
S 56th St	S Cotner Blvd	A St	2	0.49	12,000	15,200	5,880	7,448
S 56th St	A St	South St	2	0.38	12,000	17,150	4,560	6,517
S 56th St	South St	Normal Blvd	4	0.24	16,000	21,500	3,840	5,160
S 56th St	Normal Blvd	Van Dorn St	4	0.34	20,000	25,200	6,800	8,568
S 56th St	Van Dorn St	Calvert St	4	0.49	20,000	24,000	9,800	11,760
S 56th St	Calvert St	Pioneers Blvd	4	0.45	20,000	23,300	9,000	10,485
S 56th St	Pioneers Blvd	Old Cheney Rd	4	1.31	28,000	23,000	36,680	30,130
S 56th St	Old Cheney Rd	London Rd	4	0.43	28,000	12,500	12,040	5,375
S 56th St	London Rd	Pine Lake Rd	2	0.63	10,000	7,400	6,300	4,662
S 56th St	Pine Lake Rd	City Limt	2	0.50	10,000	6,600	5,000	3,300
N Cotner Blvd	Adams St	Leighton Ave	2	0.45	12,000	13,000	5,400	5,850
N Cotner Blvd	Leighton Ave	Holdrege St	2	0.99	12,000	16,300	11,880	16,137
N Cotner Blvd	Holdrege St	Starr St	2	0.08	12,000	10,300	960	824
N 66th St	Starr St	Bethany Park Dr	2	0.38	12,000	9,400	4,560	3,572
N 66th St	Bethany Park Dr	Vine St	2	0.05	12,000	9,400	600	470
N 66th St	Vine St	Q St	4	0.30	28,000	12,250	8,400	3,675
N 66th St	Q St	O St	4	0.20	28,000	12,250	5,600	2,450
N 70th St	Fletcher Ave	Cornhusker Hwy	2	0.28	12,000	5,400	3,360	1,512
N 70th St	N Cotner Blvd	Platte Ave	2	0.42	12,000	8,800	5,040	3,696
N 70th St	Platte Ave	Fremont St	2	0.69	12,000	11,500	8,280	7,935

Street Name	From	To	Lns	Miles	Capacity	Volume	VMC	VMT
N 70th St	Fremont St	Adams St	2	0.42	12,000	11,800	5,040	4,956
N 70th St	Adams St	Holdrege St	2	1.02	12,000	17,000	12,240	17,340
N 70th St	Starr St	Vine St	2	0.43	10,000	16,900	4,300	7,267
N 70th St	Vine St	Eastborough Ln	4	0.30	28,000	19,350	8,400	5,805
N 70th St	Eastborough Ln	O St	4	0.20	28,000	19,350	5,600	3,870
S 70th St	O St	S Wedgewood	4	0.50	28,000	29,300	14,000	14,650
S 70th St	S Wedgewood	A St	4	0.82	28,000	32,450	22,960	26,609
S 70th St	A St	South St	4	0.50	28,000	30,350	14,000	15,175
S 70th St	South St	Van Dorn St	4	0.50	28,000	26,000	14,000	13,000
S 70th St	Van Dorn St	Pioneers Blvd	4	1.13	28,000	22,950	31,640	25,934
S 70th St	Pioneers Blvd	Forest Lake Blvd	4	0.46	28,000	19,000	12,880	8,740
S 70th St	Forest Lake Blvd	Old Cheney Rd	4	0.67	28,000	14,600	18,760	9,782
S 70th St	Old Cheney Rd	Southfork Blvd	4	0.40	28,000	7,300	11,200	2,920
S 70th St	Southfork Blvd	Nebraska Hwy	4	0.25	28,000	5,700	7,000	1,425
S 70th St	Nebraska Hwy	Pine Lake Rd	4	0.36	28,000	2,900	10,080	1,044
N 84th St	Cornhusker Hwy	Fletcher Ave.	4	0.30	28,000	12,050	8,400	3,615
N 84th St	Havelock Ave	Adams St	4	1.00	28,000	16,000	28,000	16,000
N 84th St	Adams St	Holdrege St	4	1.01	28,000	18,100	28,280	18,281
N 84th St	Holdrege St	Vine St	4	0.53	28,000	19,600	14,840	10,388
N 84th St	Vine St	O St	4	0.56	28,000	20,700	15,680	11,592
S 84th St	O St	A St	4	1.14	28,000	17,900	31,920	20,406
S 84th St	A St	South St	4	0.51	28,000	16,900	14,280	8,619
S 84th St	South St	Van Dorn St	4	0.49	28,000	14,200	13,720	6,958
S 84th St	Van Dorn St	Montello Rd	4	0.95	28,000	14,100	26,600	13,395
S 84th St	Montello Rd	Pioneers Blvd	2	0.52	12,000	14,100	6,240	7,332
S 84th St	Pioneers Blvd	Old Cheney Rd	2	1.14	12,000	11,300	13,680	12,882
S 84th St	Old Cheney Rd	Nebraska Hwy	2	**0.75**	12,000	7,400	9,000	5,550
Capitol Pkwy	S. 21st St.	"J" St.	4	0.41	28,000	15,000	11,480	6,150
Capitol Pkwy	"J" St.	S. 27th St.	4	0.47	28,000	26,000	13,160	12,220
Capitol Pkwy	S. 27th St.	"A" St.	4	0.47	28,000	26,200	13,160	12,314
Capitol Pkwy W.	S. Coddington	Homestead Exp.	2	0.34	12,000	8,500	4,080	2,890
Capitol Pkwy W.	Homestead Exp.	S. Folsom	4	0.79	28,000	9,400	22,120	7,426
Capitol Pkwy W.	S. Folsom	9th St.	4	1.33	28,000	13,600	37,240	18,088
Normal Blvd.	"A" St.	South St.	4	0.72	28,000	24,300	20,160	17,496
Normal Blvd.	South St.	S. 40th St.	4	0.14	28,000	21,600	3,920	3,024
Normal Blvd.	S. 40th St.	S. 48th St.	4	0.53	28,000	19,200	14,840	10,176
Normal Blvd.	S. 48th St.	S. 56th St.	4	0.47	28,000	14,500	13,160	6,815
Normal Blvd.	S. 56th St.	S. 70th St.	2	1.19	12,000	13,000	14,280	15,470
N. Cotner Blvd.	Cornhusker Hwy	N. 70th St.	2	0.35	10,000	4,500	3,500	1,575
N. Cotner Blvd.	Starr St.	"O" St.	2	0.85	12,000	10,800	10,200	9,180
S. Cotner Blvd.	"O" St.	Randolph St.	3	0.70	21,000	14,500	14,700	10,150
S. Cotner Blvd.	Randolph St.	South St.	2	1.39	12,000	10,300	16,680	14,317

Street Name	From	To	Lns	Miles	Capacity	Volume	VMC	VMT
Sheridan Blvd.	South St.	S. 27th St.	2	0.36	12,000	4,300	4,320	1,548
Sheridan Blvd.	S. 27th St.	S. 33rd St.	2	0.73	12,000	10,600	8,760	7,738
Sheridan Blvd.	S. 33rd St.	S. 40th St.	2	0.51	12,000	7,700	6,120	3,927
Sheridan Blvd.	S. 40th St.	Calvert St.	2	0.21	12,000	6,500	2,520	1,365
Touzalin Ave.	Havelock Ave.	Hartley St.	2	0.65	12,000	8,600	7,800	5,590
Touzalin Ave.	Hartley St.	Adams St.	2	0.35	12,000	3,500	4,200	1,225
Park Blvd.	South St.	Van Dorn St.	2	0.42	12,000	8,100	5,040	3,402
N. 1st St.	Superior St.	Benton St.	2	0.48	10,000	9,500	4,800	4,560
Pine Lake Rd.	S. 84th St.	S. 87th St.	2	0.25	12,000	2,000	3,000	500
Pine Lake Rd.	S. 87th St.	S. 91st St.	2	0.25	12,000	2,000	3,000	500
NW 12th St.	W. Fletcher Ave.	ISAAC	2	0.69	12,000	6,500	8,280	4,485
Coddington Ave.	“A” St.	Van Dorn St.	2	1.01	12,000	6,500	12,120	6,565
NW 1st St.	W. Fletcher Ave.	Superior St.	4	0.97	28,000	5,800	27,160	5,626
N. 33rd St.	Fletcher Ave.	Superior St.	4	1.23	28,000	2,500	34,440	3,075
Fletcher Ave.	Meridian	N. 22nd St.	4	0.62	28,000	3,400	17,360	2,108
Fletcher Ave.	NW 12th St.	NW 1st St.	2	0.80	12,000	7,400	9,600	5,920
Highlands Blvd.	NW 12th St.	NW 1st St.	4	0.81	28,000	8,600	22,680	6,966
Havelock Ave.	N. 70th St.	N. 84th St.	2	1.00	12,000	2,300	12,000	2,300
“R” St.	N. 56th St.	Cotner Blvd.	4	0.18	28,000	16,000	5,040	2,880
N. 44th St.	“R” St.	“O” St.	4	0.23	28,000	4,600	6,440	1,058
N. 45th/46th St.	Vine St.	“R” St.	4	0.27	16,000	7,600	4,320	2,052
N. 52nd St.	“R” St.	“O” St.	2	0.24	12,000	3,600	2,880	864
W. “A” St.	SW 40th St.	Coddington Ave.	2	1.50	12,000	3,300	18,000	4,950
Nebr. Highway 2	Van Dorn St.	Pioneers Blvd.	4	0.68	28,000	31,200	19,040	21,216
Nebr. Highway 2	Pioneers Blvd.	S. 14th St.	4	0.23	28,000	30,100	6,440	6,923
Nebr. Highway 2	S. 14th St.	S. 27th St.	4	0.91	28,000	32,500	25,480	29,575
Nebr. Highway 2	S. 27th St.	S. 33rd St.	4	0.54	28,000	34,500	15,120	18,630
Nebr. Highway 2	S. 33rd St.	S. 40th St.	4	0.64	28,000	30,800	17,920	19,712
Nebr. Highway 2	S. 40th St.	S. 48th St.	4	0.56	28,000	26,700	15,680	14,952
Nebr. Highway 2	S. 48th St.	S. 56th St.	4	0.54	28,000	23,100	15,120	12,474
Nebr. Highway 2	S. 56th St.	Old Cheney Rd.	4	0.24	28,000	17,800	6,720	4,272
Nebr. Highway 2	Old Cheney Rd.	S. 70th St.	4	1.00	28,000	13,800	28,000	13,800
Nebr. Highway 2	S. 70th St.	Pine Lake Rd. W	4	0.68	28,000	13,800	19,040	9,384
Nebr. Highway 2	S. 84th St.	S. 91st St.	4	0.55	28,000	13,800	15,400	7,590
Sun Valley Blvd.	Saunders Ave.	N. 10th St.	4	0.30	28,000	20,500	8,400	6,150
Sun Valley Blvd.	N. 10th St.	Charleston St.	2	0.70	12,000	8,700	8,400	6,090
Sun Valley Blvd.	Charleston St.	Line Drive	2	0.23	12,000	13,000	2,760	2,990
Sun Valley Blvd.	Line Drive	Westgate Blvd.	2	0.48	12,000	13,000	5,760	6,240
Sun Valley Blvd.	Westgate Blvd.	W. “P” St.	2	0.24	12,000	13,800	2,880	3,312
Sun Valley Blvd.	W. “P” St.	W. “O” St.	4	0.08	28,000	13,800	2,240	1,104
W. Cornhusker	I-80 (Ramp)	N. 1st St.	4	1.56	28,000	18,400	43,680	28,704
Cornhusker Hwy	N. 1st St.	N. 11th St.	4	1.12	28,000	22,000	31,360	24,640

Street Name	From	To	Lns	Miles	Capacity	Volume	VMC	VMT
Cornhusker Hwy	N. 11th St.	N. 14th St.	4	0.45	28,000	28,700	12,600	12,915
Cornhusker Hwy	N. 14th St.	N. 20th St.	4	0.36	28,000	34,400	10,080	12,384
Cornhusker Hwy	N. 20th St.	N. 27th St.	4	0.52	28,000	33,900	14,560	17,628
Cornhusker Hwy	N. 27th St.	State Fair Park	4	0.18	28,000	32,200	5,040	5,796
Cornhusker Hwy	State Fair Park	N. 33rd St.	4	0.35	28,000	31,100	9,800	10,885
Cornhusker Hwy	N. 33rd St.	Adam St.	4	0.15	28,000	31,100	4,200	4,665
Cornhusker Hwy	Adams St.	N. 35th St.	4	0.16	28,000	31,100	4,480	4,976
Cornhusker Hwy	N. 35th St.	N. 40th St.	4	0.48	28,000	20,800	13,440	9,984
Cornhusker Hwy	N. 40th St.	N. 44th St.	4	0.23	28,000	20,800	6,440	4,784
Cornhusker Hwy	N. 44th St.	N. 48th St.	4	0.36	28,000	19,100	10,080	6,876
Cornhusker Hwy	N. 48th St.	Havelock/Sup.	4	0.66	28,000	17,700	18,480	11,682
Cornhusker Hwy	Havelock/Sup.	Link 55X/56th	4	0.15	28,000	20,700	4,200	3,105
Cornhusker Hwy	Link 55X/56th	N. 70th St.	4	1.23	28,000	13,900	34,440	17,097
Cornhusker Hwy	N. 70th St.	N. Cotner/City L.	4	0.43	28,000	12,300	12,040	5,289
Van Dorn St.	S. 10th St.	Park Blvd.	4	0.45	28,000	18,000	12,600	8,100
Van Dorn St.	SW 15th St.	Coddington Ave.	2	0.31	12,000	3,000	3,720	930
Warlick Blvd.	Old Cheney Rd.	W. City Limits	4	0.58	28,000	8,000	16,240	4,640
Hwy 34	NW 27th St.	Fletcher Ave.	4	2.16	28,000	12,600	60,480	27,216
Total							3,425,640	2,606,239

Source: Arterial segment descriptions, number of lanes and segment lengths outside of exclusion area from City of Lincoln Public Works Department, October 25, 2002; capacities based on vehicles per lane per day from the Lincoln Travel Model; volumes from City of Lincoln Public Works Department, "2000 Estimated Adjusted Average 24 Hr. Traffic Volumes," June 18, 2001.